

Service-Manual

VCR
1995

NOKIA

VCR 3706 NE
VCR 3706 CE
VCR 3706 SE
VCR 3716 NE
VCR 3716 CE
VCR 3716 I
VCR 3716 EP
VCR 3716 UK

LUXOR

VCR 4706 NE

FINLUX

VCR 7156 NE

Circuit diagrams, P.C.B., spare parts list, electrical alignment,
mechanical adjustments

Safety Component!

This symbol identifies in the circuit diagrams all safety critical parts. Replace only with
specified part numbers.

**Service and repair work to be performed only in accordance with existing safety
regulations!**



6611 9038

PRECAUTIONS IN PART REPLACEMENT

When servicing the unit with power on, be careful with the section marked white all over.

This is the primary power circuit which is live.

When checking the soldering side in the tape travel mode, make sure first that the tape has been loaded and then turn over the PWB with due care to the primary power circuit.

Make readjustment, if needed after replacement of part, with the mechanism and its PWB in position in the main frame.

(1) Start and end sensors: Q851 and Q852

Insert the sensor's projection deep into the upper hole of the holder. Referring to the PWB, fix the sensors tight enough.

(2) Photocoupler: IC901

Refer to the symbol on the PWB and the anode marking of the part.

(3) Cam switches A and B: D852 and D853

Adjust the notch of the part to the white marker of the symbol on the PWB. Do not allow any looseness.

(4) Take-up and supply sensors: D855 and D854

Be careful not to confuse the setting direction of the parts in reference to the symbols on the PWB. Do not allow any looseness.

(5) Diode bridge: D901

Adjust the + marking of the part to the symbol's cathode marking on the PWB.

1. SPECIFICATIONS

Format:	VHS PAL standard
Video recording system:	Two rotary heads, helical scan system
Video signal:	PAL/MESECAM colour and B/G signals, 625 lines
Recording/playing time:	260 min max. with E-260 tape (SP) 520 min max. with E-260 tape (LP)
Tape width:	12.7mm
Tape speed:	23.39 mm/s (SP) 11.70 mm/s (LP)
Antenna:	75 ohm unbalanced
Receiving channel:	VHF Channel S1-S41, E2-E12 UHF Channel E21-E69 UHF Channel E30-E39 (preset to CH E36)
RF converter output signal:	
Power requirement:	AC230V, 50Hz
Power consumption:	Approx. 17 W or 19W (LP4 head models)
Operating temperature:	5°C to 40°C
Storage temperature:	-20°C to 60°C
Weight:	Approx. 3.5 kg
Dimensions:	380 mm (W) x 290.3 mm (D) x 91.8 mm (H)
VIDEO	
Input:	1.0 Vp-p, 75 ohm
Output:	1.0 Vp-p, 75 ohm
S/N ratio:	45 dB
Horizontal resolution:	250 lines
AUDIO	0 dBs = 0.775 Vrms
Input:	Line: -3.8 dB, 47k ohm
Output:	Line: -3.8 dB, 1k ohm
S/N ratio:	42 dB
Frequency response:	80 Hz ~ 10 kHz
Accessories included:	75 ohm coaxial cable Operation manual Infrared remote control Battery (2pcs.)

As part of our policy of continuous improvement, we reserve
the right to alter design and specifications without notice.

Note:
The antenna must correspond to the new standard DIN 45325
(IEC 169 - 2) for combined UHF/VHF antenna with 75 ohm connector.

PRECAUTIONS IN SERVICING

1. Mounting the PWBs

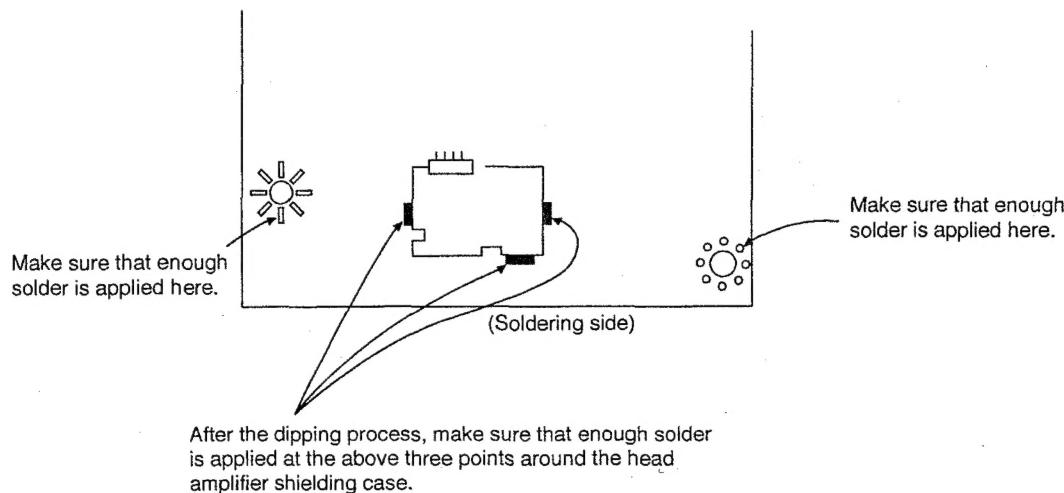
(1) Hand-inserted parts

Make sure that the tuner, RCA jack, 21-pin socket, plug socket, remote control receiver, shielding case, switches, mechanism sensors and other hand-inserted parts are tight in position.

- ① The general safety instructions are issued by Safety Group. Follow the "Safety Precautions". Also be sure that the primary-power capacitors C905, C906 and C915 (parts depending on models) are tight enough in place.
- ② Handle the sensors and switches (start sensor, end sensor, cam switch, reel sensor, and record tip sensor) with care.

(2) Soldered parts

- ① The board-to-board connector "AO", RCA jack and some other parts are soldered in position.



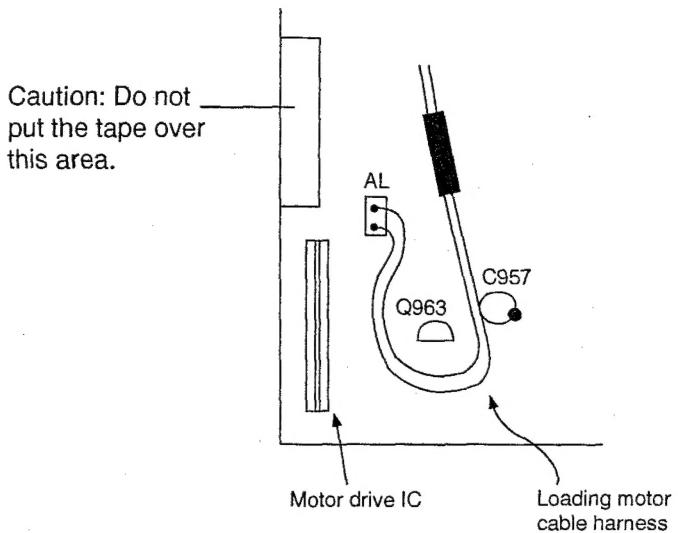
(3) Coaxial cables

Connect the cable's L-shaped end to the tuner and the straight end to the converter.

2. Assembling the chassis

(1) Dressing the cables

- ① Be careful not to connect the flexible flat cables upside down. Their sockets are in special shape.
- ② Install the harnesses with care not to get caught by the frame and the mechanism (cassette controller).
- ③ Make sure that all the harnesses are tight in position.
- ④ Shape the loading motor cable harness as shown over.



(2) Mounting the mechanism

- * Set up the mechanism with care to the sensors and the record tip switch. Keep the sensors free of dust, grease, etc.
- * Install the capstan motor with correct connections between the circuit boards.

(3) Tightening the screws

Follow the instructions from Mechanism Group.

2. DISASSEMBLY AND REASSEMBLY

2-1 DISASSEMBLY OF MAJOR BLOCKS

TOP CABINET
BOTTOM PLATE

- : Remove 4 screws①
- : Remove 2 screw② and 8 hooks

FRONT PANEL

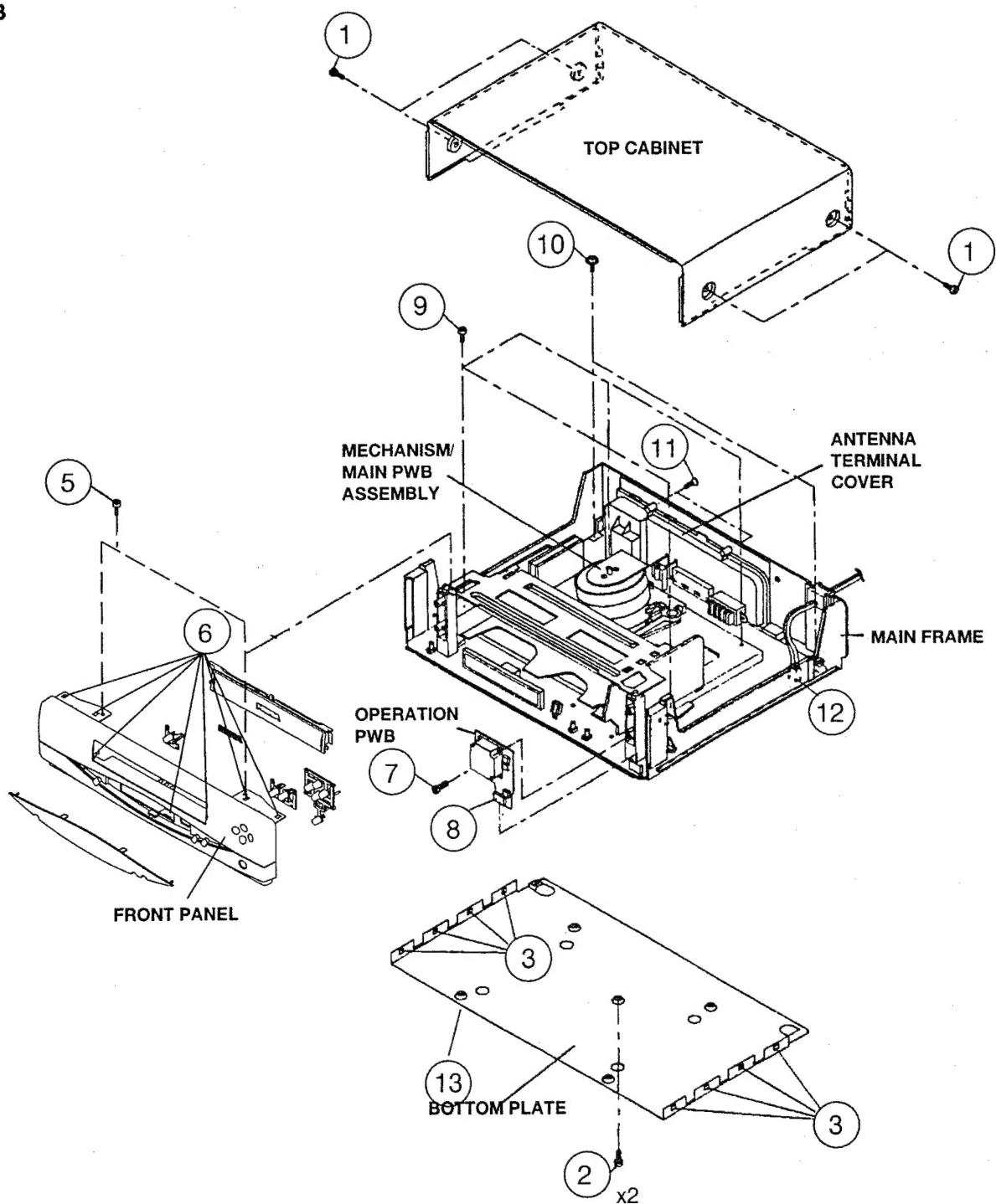
- ③ Remove 2 screws⑤ and 7 clips 6.

OPERATION
(SHUTTLE JOG)
PWB

- ④ Remove 1 screw⑦ Take it out of connector⑧

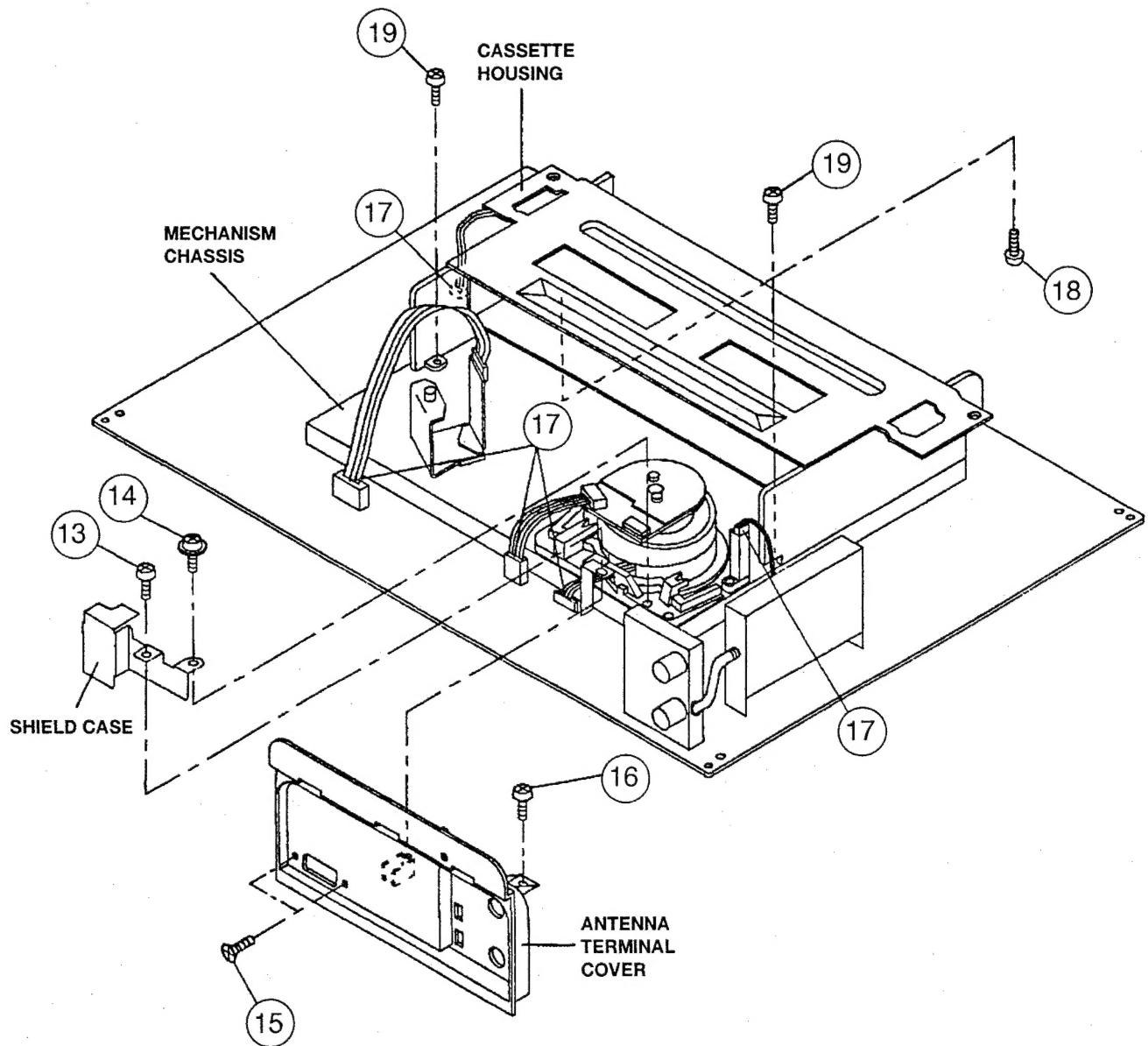
MECHANISM/
MAIN PWB
ASSEMBLY

- : Remove 4 screws⑨ 2 screws⑩ and 1 underneath ⑪ 2 screws⑫ and 1 connector ⑬ Lift the antenna terminal cover and take the assembly out of the main frame.



2-2 DISASSEMBLING THE MECHANISM/MAIN PWB ASSEMBLY

SHIELD CASE	: Remove 1 screw ⑬ and 1 screw ⑭.	Remove 1 screw ⑮ from behind the main PWB.
ANTENNA TERMINAL COVER	: Remove 2 screws ⑯ and 1 screw ⑰.	Lift the mechanism chassis/cassette housing assembly vertically to take it out of the main PWB.
MECHANISM CHASSIS/CASSETTE HOUSING ASSEMBLY	: Remove 3 FFCs and 2 harnesses ⑯. : Be careful not to confuse the top and bottom of the FFC.	: Remove 2 screws ⑲.
		CASSETTE HOUSING



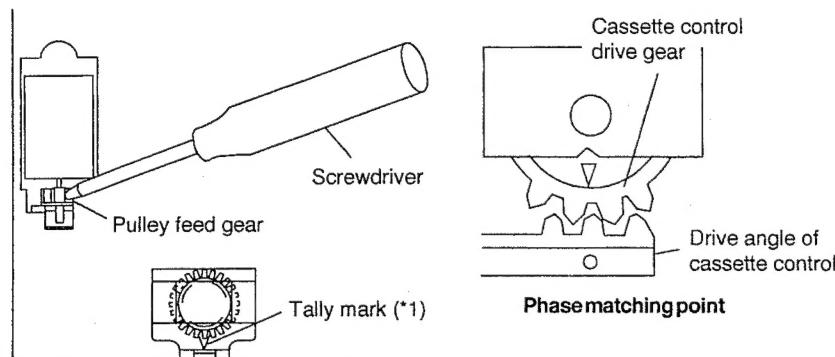
2-3 PRECAUTIONS IN REASSEMBLING

MOUNTING THE CASSETTE CONTROLLER

Initial setting is indispensable before placing the cassette controller in the mechanism. The initial setting is made in two ways; electrical and mechanical.

Electrical setting:

Make a connection between TP5001 and TP5002, both located at the center on your side on main PWB, with a 22 ohm resistor and be sure that the mechanism is back to its initial setting position (*1). Now place the cassette controller in position. (This method is used when the mechanism has been already set on its PWB.)



Mechanical setting:

Turn the loading motor's pulley feed gear using a screwdriver and be sure that the mechanism is back to its initial setting position (*1). Now place the cassette controller in position. (This method is applicable for the mechanism alone.)

COUPLING THE MECHANISM TO THE PWB

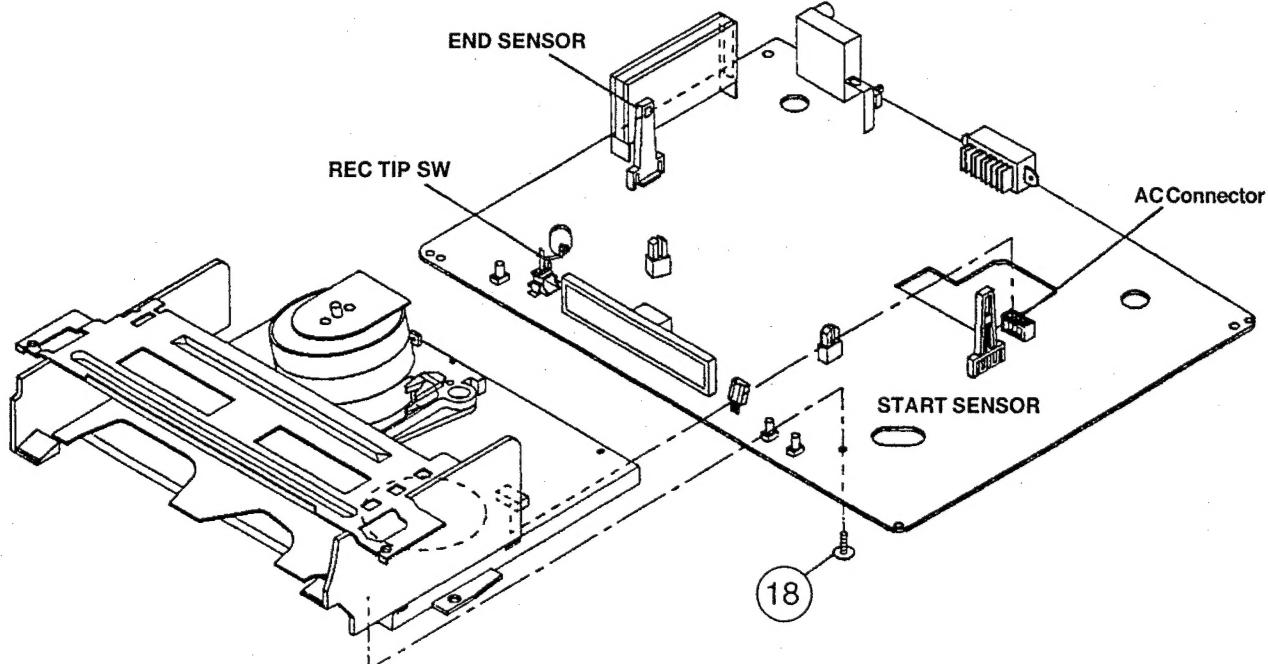
Match the mechanism's projections with the two symbols (round reference and oval sub-reference) on the main PWB. Place the mechanism straight down in position with due care so that the mechanism chassis's outer edges should not damage any parts nearby.

Tighten up the two screws (one for fixing the mechanism and the head amplifier shield, the other on the main PWB's soldering side and located near the loading motor) to fix the mechanism and main PWB. Reconnect the FFC cables (AA, AD and AH) and harnesses (AE and AL) between the mechanism and main PWB.

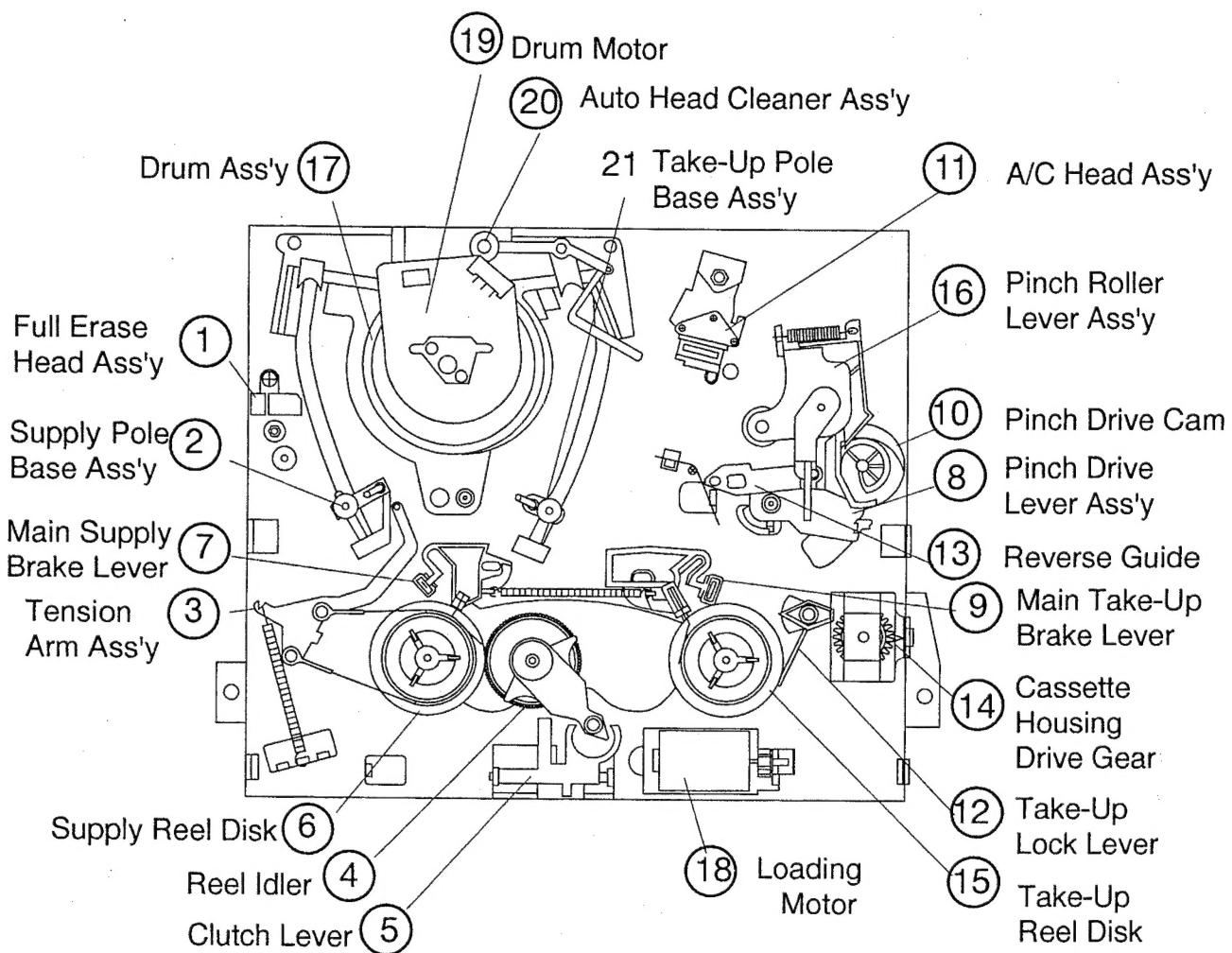
Parts to pay attention to:

Start and end sensors Q851, Q852
Record tip switch S851

Take special care of the MC-AC connector (board to board) between the mechanism and main PWB.

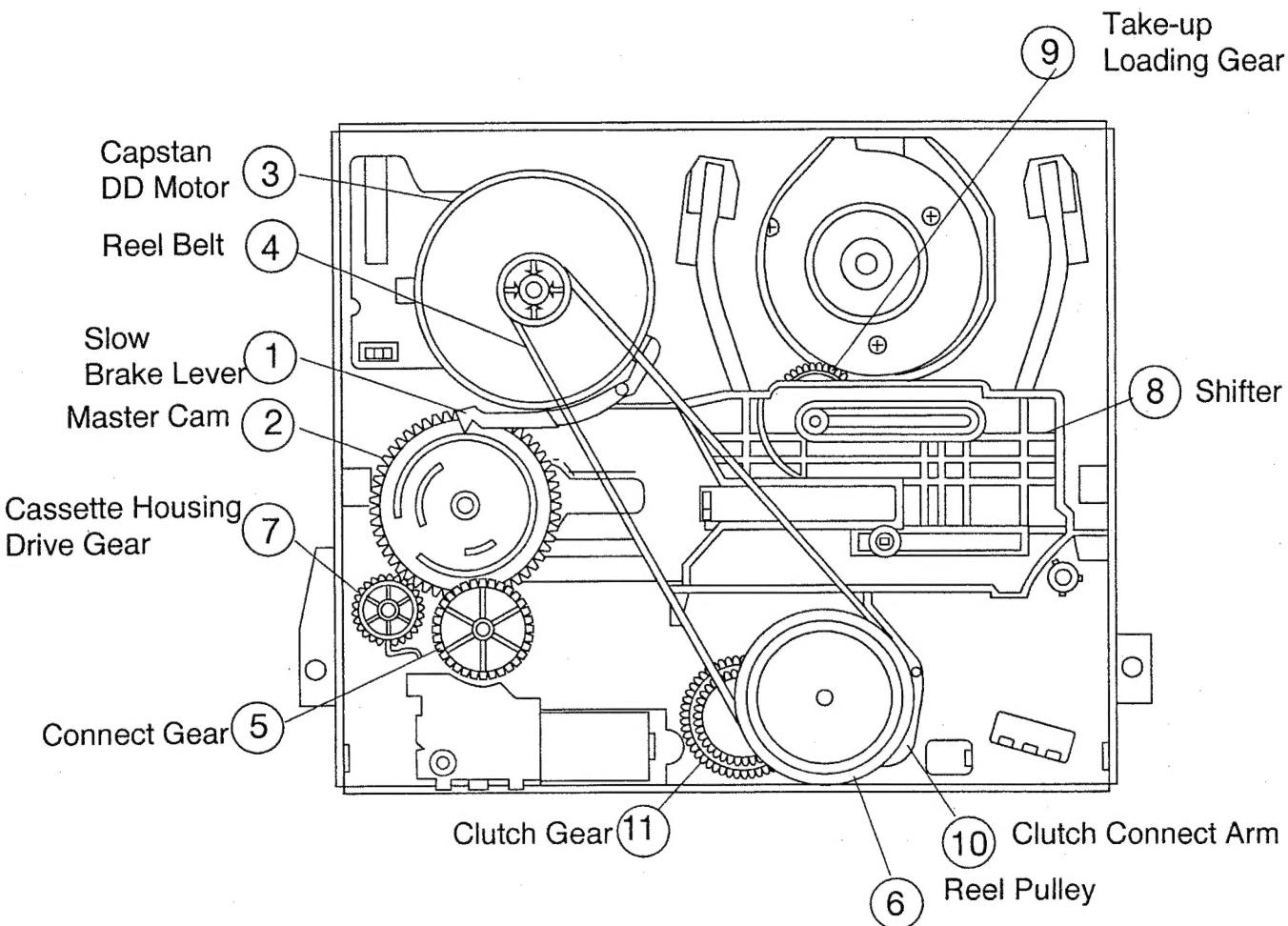


3. FUNCTION OF MAJOR MECHANICAL PARTS (TOP VIEW)



No.	Function	No.	Function
1.	Full erase head ass'y Erase the whole records on the tape in the recording mode.	13.	Reverse guide Pulls out the tape and controls the tape drive train height with the upper and lower guides.
3.	Tension arm ass'y Detects the tension of tape while running, and brakes the supply reel disk via the tension band.	16.	Pinch roller lever ass'y Press-fits the tape to the capstan during tape running. The right protrusion switches the clutch of the cassette housing control assembly in "tape eject", and makes the mechanism eject tape.
7.	Main supply brake lever Brakes the supply reel disk to prevent tape slackening when the unit is stopped in fast forward or rewind mode.	18.	Loading motor A motive power which drives the mechanism. It transmits the power to the master cam and cassette housing control assembly.
9.	Main take-up brake lever Brakes the take-up reel disk to prevent tape slackening when the unit is stopped in fast forward or rewind mode.		

FUNCTION OF MAJOR MECHANICAL PARTS (BOTTOM VIEW)



No.	Function	No.	Function
1.	Slow brake lever Gets in contact with the capstan D.D. motor linking to the master cam in the slow still mode, and brakes it to a certain degree.	6.	Reel pulley Transmits the power of the capstan D.D. motor to the reel disk via the reel idler.
3.	Capstan D.D. motor A motive power which runs the tape. It transmits the power via the reel belt.	8.	Shifter Transmits the operation of the master cam to break and loading gear.
4.	Reel belt Transmits the power to run the tape to the reel pulley.	9.	Take-up loading gear Shifts the take-up pole base and guide roller via the loading relay gear, and applies the tape around the drum assembly, as well as transmits the power to the supply loading gear.

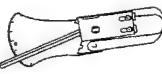
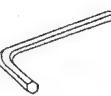
4. ADJUSTMENT, REPLACEMENT AND ASSEMBLY OF MECHANICAL UNITS

Here we will describe a relatively simple service work in the field, not referring to the more complicated repairs which would require the use of special equipment and tools (drum assembly replacement, for example).

We are sure that the easy-to-handle tools listed below would be more than handy for periodical maintenance to keep the machine in its original working condition.

TOOLS NECESSARY FOR ADJUSTING THE MECHANICAL UNITS

The following tools are required for proper service and satisfactory repair.

No.	Jig Item	Part No.	Configuration	Remarks
1	Reel Disk Height Adjusting Jig	JiGRH0002		These Jigs are used for checking and adjusting the reel disk height.
2	Master Plane Jig	JiGMP0001		
3	A/C Head Tilt Adjusting Jig	9DAACH-A323U		This Jig is used for setting the A/C head tilt.
4	Torque Gauge (90g)	JiGTG0090		These Jigs are used for checking and adjusting the torque of take-up and supply reel disks.
	Torque Gauge (1.2kg)	JiGTG1200		
5	Gauge Head	JiGTH0006		
6	Cassette Torque Meter	JiGVHT-063		This cassette torque meter is used for checking and adjusting the torque of take-up for measuring tape back tension.
7	Tension Gauge (300g)	JiGSG0300		There are two gauges used for the tension measurements, 300 g and 2.0kg.
	Tension Gauge (2.0kg)	JiGSG2000		
8	Hex Wrench (1.2mm)	JiGHW0012		These Jigs are used for loosening or tightening special hexagon type screws.
	Hex Wrench (1.5mm)	JiGHW0015		
9	Alignment Tape (PAL)	VROCPSP		These tapes are especially used for electrical fine adjustment.
11	Tension Gauge Adapter	JiGADP003		This Jig is used with the tension gauge. Rotary transformer clearance adjusting jig.

No.	Jig Item	Part No.	Configuration	Remarks
12	Special Bladed Screwdriver	JiGDRIVERH-4		This screwdriver is used for adjusting the guide roller height.
14	Torque Driver	JiGTD1200		This is used to screw down resinmade parts: the specified torque is 5kg.
15	Box Driver	JiGDRIVER110-7		This Jig is used for height adjustment of the A/C head and X-position.
		JiGDRIVER110-4		This Jig is used for replacement of the SI roller.
16	Reverse Guide Height Adjusting Jig	JiGRVGH-F18		This Jig is used for height adjustment of the reverse guide.

MECHANICAL PARTS REQUIRING PERIODICAL INSPECTION

Use the following table as a guide to maintain the mechanical parts in good operating condition.

Parts	Maintained	500 hrs.	1000 hrs.	1500 hrs.	2000 hrs.	Possible symptom encountered	Remarks
Guide roller ass'y		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Lateral noises Head occasionally blocked	Abnormal rotation or significant vibration requires replacement.
Supply impedance roller		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		Clean with pure high quality isopropyl alcohol.
Supply impedance roller (inner hole and shaft)			<input type="checkbox"/>		<input type="checkbox"/>		
Supply impedance roller flange		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Retaining guide		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		Clean tape contact part with the specified cleaning liquid.
Slant pole		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Video head (upper drum ass'y)		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Poor S/N ratio, no colour	Clean tape contact area with the specified cleaning liquid.
Full-erase head		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Poor colour, beating	
A/C head		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Sound too small or distorted	
Lower drum ass'y						Poor flatness of the envelope with alignment tape	
Capstan D.D. Motor		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No tape running, uneven colour	
Pinch roller		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No tape running, tape slack	Clean rubber and rubber contact area with the specified cleaning liquid.
Reel belt			<input type="checkbox"/>		<input checked="" type="checkbox"/>	No tape running, tape slack, no fast forward/rewind motion	
Tension band ass'y					<input checked="" type="checkbox"/>	Cassette not loaded or unloaded	
Loading Motor					<input checked="" type="checkbox"/>		
Reel idler ass'y					<input checked="" type="checkbox"/>	No tape running	
Reel pulley ass'y			<input type="checkbox"/> <input checked="" type="checkbox"/>		<input type="checkbox"/> <input checked="" type="checkbox"/>		
Clutch gear ass'y					<input checked="" type="checkbox"/>		
Main supply/take-up brake levers					<input checked="" type="checkbox"/>	Tape slack	
AHC (Automatic Head Cleaner)				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		Replace the roller of the cleaner when it wears down. Just change the AHC roller assembly for new one.

NOTE: : Part replacement.

: Cleaning (For cleaning, use a lint-free cloth dampened with pure isopropyl alcohol).

: Oil refilling (The indicated point should be lubricated with high quality spindle oil every 1000hrs).

If the reading is out of the specified value, clean or replace the part.

REMOVAL AND REASSEMBLY OF CASSETTE HOUSING CONTROL ASSEMBLY

• Removal

1. Set the cassette ejected condition in the cassette eject mode.
2. Unplug the recorder from the main source.
3. Follow the procedures below in the specified order.
 - a) Remove the cassette housing installation screws ① and ②
 - b) Slide and pull out the cassette housing control assembly upward.

• Reassembly

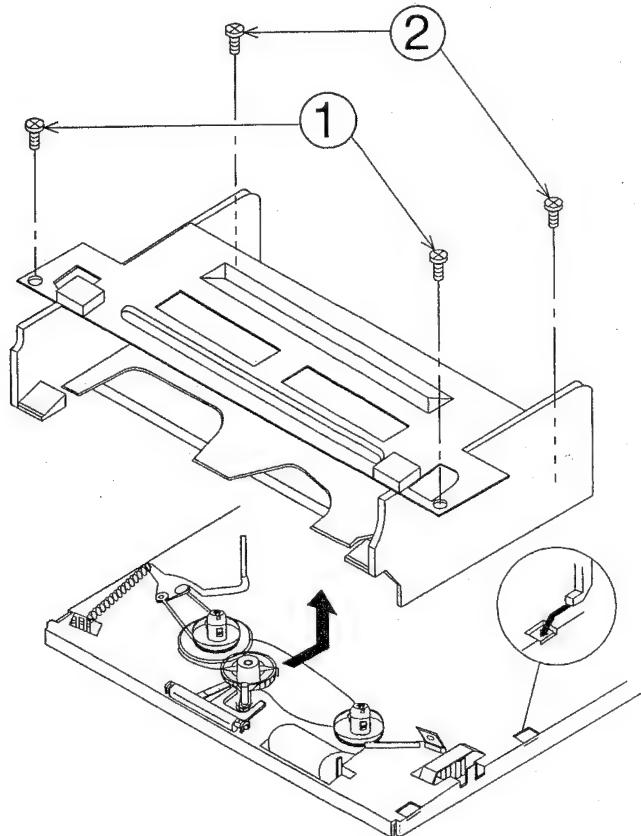


Figure 4-1.

1. Before installation of the cassette housing control assembly, make a connection between TP5001 and TP5002 , both located at the center on your side on the main PWB, with a 22 ohm resistor. Plug in the power cord. The cassette control drive gear starts and stops just when a tally mark appears in the mechanism chassis window. Align this tally mark with the cassette control drive angle's mark, as shown in Fig. 4-2, to position the cassette control on the mechanism chassis.

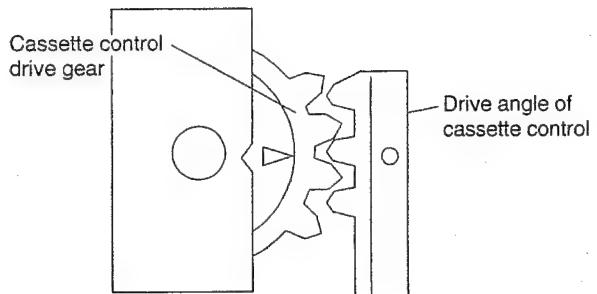


Figure 4-2.

2. Follow the procedures for removal in the reverse order.

Notes:

- ① In using a magnet screw driver, be sure to keep it away from the A/C head, FE (Full Erase) head, or the drum.
- ② In removal and reassembly, take care not to hit the cassette housing control assembly or tools against the guide pin, drum, or the like thereabout.
- ③ Load the cassette once onto the cassette housing control assembly after reassembly.

TO RUN A TAPE WITHOUT THE CASSETTE HOUSING CONTROL ASSEMBLY

1. Be sure to make a connection between TP5001 and TP5002 , both located at the center on your side on the main PWB, with a 22 ohm resistor, before turning on the power.
2. Plug in the power cord.
3. Turn on the power switch.
4. Open the lid of a cassette tape by hand.
5. Hold the lid with two pieces of vinyl tape.
6. Set the cassette tape in the mechanism chassis.
7. Stabilize the cassette tape with a weight (500g) to prevent floating.
8. Perform running test.

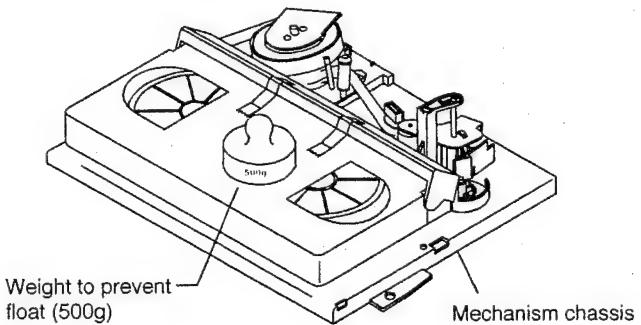


Figure 4-3.

Note:

The weight should not be more than 500g.

REPLACEMENT AND HEIGHT CHECKING AND ADJUSTMENT OF REEL DISKS

• Removal (Supply and Take-up reel disks)

1. Remove the cassette housing control assembly.
2. Pull the tension band out of the tension arm.
3. Remove the supply main brake and the take-up main brake.
4. Open the hook at the top of the reel disk, and remove the reel disk.

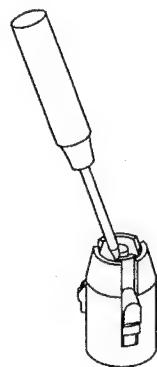
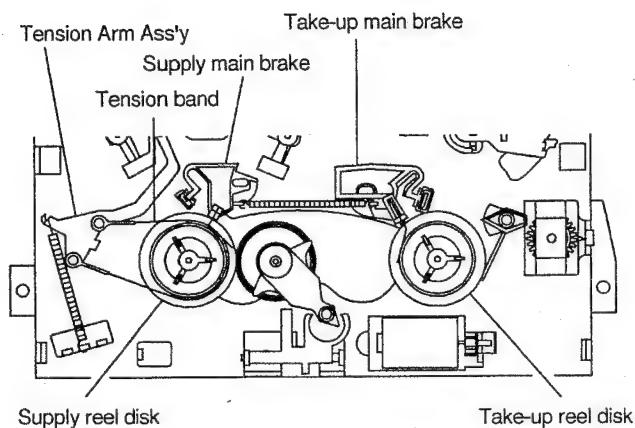


Figure 4-4.

Note:

When the tension band is pressed in the direction of the arrow for removal, the catch is hard to be deformed.



Figure 4-5.

• Reassembly (Supply reel disk)

1. Clean the reel disk shaft and apply oil to it.
2. Install a new supply reel disk onto the shaft.
3. Replace the tension band around the supply reel disk, and insert it to the hole of the tension arm.
4. Check the reel disk height and reassemble the supply main brake.

Notes:

- ① Take enough care not to deform the tension band during installation of the supply reel disk.
- ② Be careful not to damage the supply main brake.

• Reassembly (Take-up reel disk)

1. Clean the reel disk shaft and apply oil to it.
2. Install a new take-up reel disk onto the shaft.
3. Check the reel disk height and reassemble the take-up main brake.

Note:

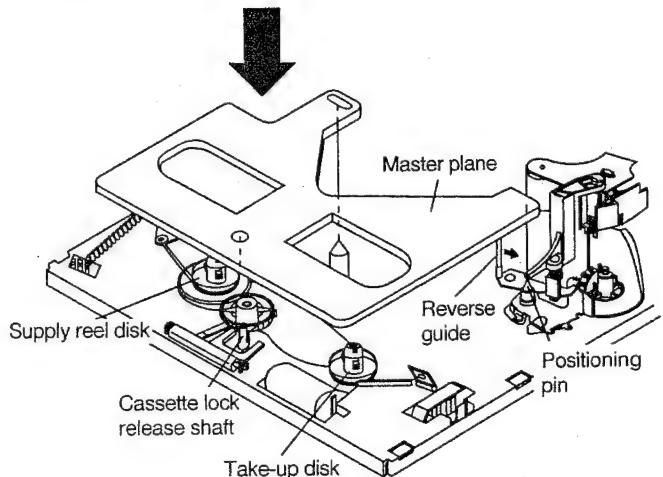
Take care not to damage the take-up main brake.

- * After reassembly, check the video search rewind back tension (see page 20), and check the brake torque (see page 23).

• Height checking and adjustment

Note:

Place the master plane onto the mechanism unit, taking care not to hit the drum (see Figure 4-6).



Set the master plane releasing the reverse guide by a finger.

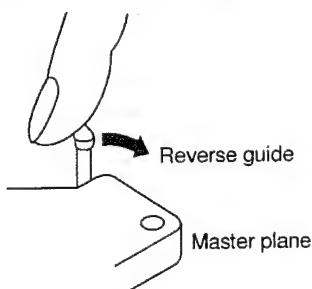


Figure 4-6.

- Check that the reel disk is lower than part A but higher than part B. If the height is not correct, readjust the reel disk height by changing the poly-slider washer under the reel disk.

Note:

Whenever replacing the reel disk, perform the height checking and adjustment.

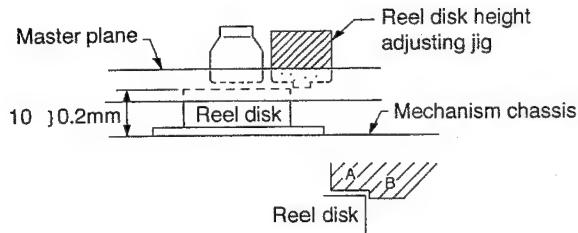


Figure 4-7.

CHECKING AND ADJUSTMENT OF TAKE-UP TORQUE IN FAST FORWARD MODE

- Remove the cassette housing control assembly.
- Make a connection between TP5001 and TP5002, both located at the center on your side on the main PWB, with a 22 ohm resistor. Now turn on the power.

Setting

- Set a torque gauge to zero on the scale. Place it on the take-up reel disk.
- Press the FF button to set the mechanism to the fast forward mode.

Checking

- Turn the torque gauge slowly (one rotation every 2 to 3 seconds) by hand in the take-up direction.
- Check to see if the take-up torque is higher than 69 mN·m (700 gf·cm).

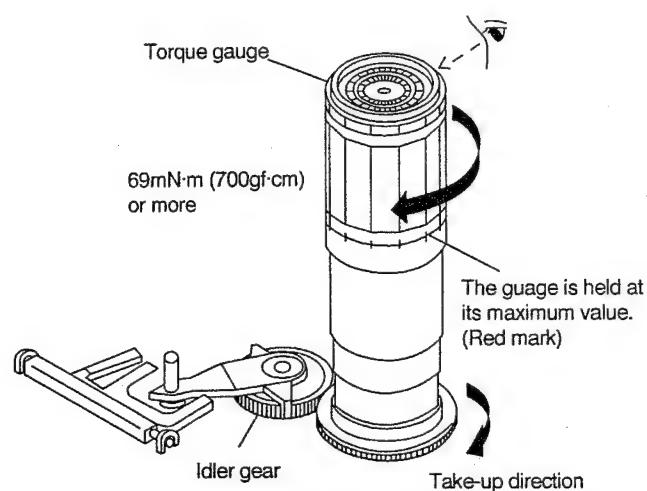


Figure 4-8.

Adjustment

- If the take-up torque is outside the range, clean the capstan D.D. motor pulley, reel belt and reel pulley with cleaning liquid, then recheck the torque.
- If the take-up torque is still out of range, replace the reel belt.

Notes:

- Hold down the torque gauge so that it does not fly off.
- When checking the take-up torque, do not keep the reel disk locked for a longer time.

CHECKING AND ADJUSTMENT OF TAKE-UP TORQUE IN REWIND MODE

- Remove the cassette housing control assembly.
- Make a connection between TP5001 and TP5002, both located at the center on your side on the main PWB, with a 22 ohm resistor. Now turn on the power.

Setting

- Set a torque gauge to zero on the scale. Place it on the supply reel disk.
- Press the REW button to set the mechanism to the rewind mode.

Checking

- Turn the torque gauge slowly (one rotation every 2 to 3 seconds) by hand in the take-up direction.
- Check to see if the take-up torque is higher than 69 mN·m (700 gf·cm).

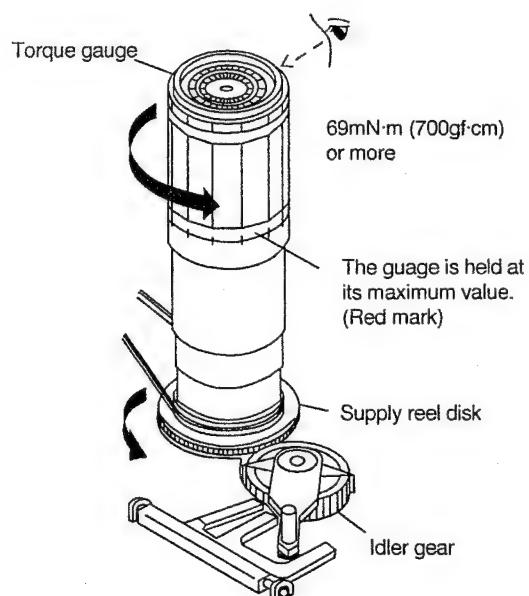


Figure 4-9.

- **Adjustment**

1. If the take-up torque is outside the range, clean the capstan D.D. motor pulley, reel belt and reel pulley with cleaning liquid, then recheck the torque.
2. If the take-up torque is still out of range, replace the reel belt.

Notes:

1. Hold down the torque gauge so that it may not fly off.
2. When checking the take-up torque, do not keep the reel disk locked for a long time.

CHECKING AND ADJUSTMENT OF TAKE-UP TORQUE IN PLAYBACK MODE

1. Remove the cassette housing control assembly.
2. Make a connection between TP5001 and TP5002, both located at the center on your side on the main PWB, with a 22 ohm resistor. Now turn on the power.
3. Open the lid of the cassette torque meter, and hold it with two pieces of vinyl tapes.
4. Load the cassette torque meter into the unit.
5. Put the weight (500g) on the cassette torque meter.
6. Press the REC button to put the unit in REC mode.

- **Checking**

Set value SP $8.8 \pm 3.8 \text{mN}\cdot\text{m}$ ($90 \pm 39 \text{gf}\cdot\text{cm}$)

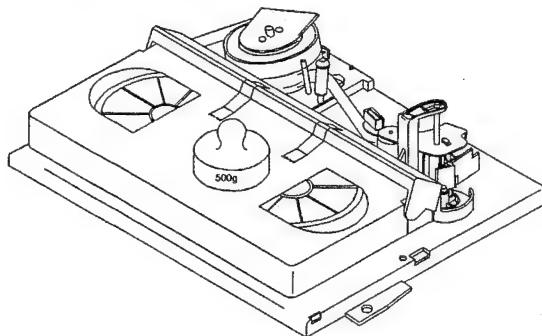


Figure 4-10.

1. Check that the torque is in the range of $8.8 \pm 3.8 \text{mN}\cdot\text{m}$ ($90 \pm 39 \text{gf}\cdot\text{cm}$).
2. The torque fluctuates due to the rotational deviation of the reel pulley ass'y. Use the center of the fluctuation as the value.
3. Place the ass'y in the SP record mode, and check that the take-up torque is within the range.

- **Adjustment**

If the take-up torque in the playback mode is outside the range, replace the reel pulley ass'y.

Note:

Stabilize the cassette torque meter to prevent floating.

CHECKING AND ADJUSTMENT OF TAKE-UP TORQUE IN VIDEO SEARCH REWIND MODE

- Remove the cassette housing control assembly.

- Make a connection between TP5001 and TP5002, both located at the center on your side on the main PWB, with a 22 ohm resistor. Now turn on the power.

- **Setting**

1. Push the PLAY button to place the ass'y in the playback mode.
2. Push the REW button to place the ass'y in the video search rewind mode.

- **Checking**

1. Place the torque gauge on the supply reel disk, and turn it counterclockwise very slowly (one rotation every 1 to 2 seconds) and check that the torque is within the set value $14.5^{+8}_{-6} \text{ mN}\cdot\text{m}$ ($148^{+80}_{-60} \text{ gf}\cdot\text{cm}$)

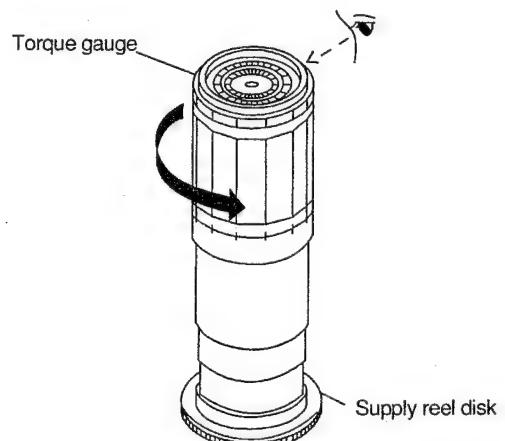


Figure 4-11.

Note:

Set the torque gauge securely on the supply reel disk. If it is not secure, the measurement will be incorrect.

- **Adjustment**

If the take-up torque in video search rewind mode is outside the range, replace the reel pulley ass'y.

Note:

The torque fluctuates due to the rotational deviation of the reel pulley ass'y. Use the center of the fluctuation at the value.

CHECKING THE FAST FORWARD BACK TENSION

Remove the cassette housing control assembly.

Make a connection between TP5001 and TP5002, both located at the center on your side on the main PWB, with a 22 ohm resistor. Now turn on the power.

Checking

1. Push the FF button to place the ass'y in the fast forward mode.
2. Place the torque gauge on the supply reel disk, and turn it clockwise very slowly (one rotation every 2 to 3 seconds) and check that the torque is $1.5 \pm 0.9 \text{ mN}\cdot\text{m}$ ($15 \pm 9 \text{ gf}\cdot\text{cm}$).

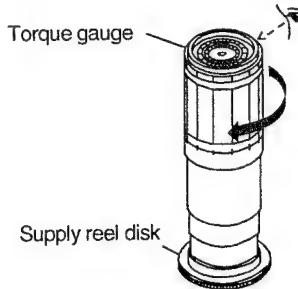


Figure 4-12.

Notes:

- ① Set the torque gauge securely on the supply reel disk. If the torque gauge is not securely set on the reel disk, measurement will be incorrect.
- ② Measure the torque with the torque gauge's weight exerted on the reel disk.

CHECKING THE REWIND BACK TENSION

- Remove the cassette housing control assembly.
- Make a connection between TP5001 and TP5002, both located at the center on your side on the main PWB, with a 22 ohm resistor. Now turn on the power.

Checking

1. Push the REW button to place the ass'y in the rewind mode.
2. Place the torque gauge on the take-up reel disk, and turn it counterclockwise very slowly (one rotation every 2 to 3 seconds) and check that the torque is $1.3 \pm 0.8 \text{ mN}\cdot\text{m}$ ($13 \pm 8 \text{ gf}\cdot\text{cm}$).

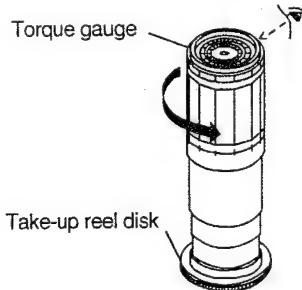


Figure 4-13.

Notes:

- ① Set the torque gauge securely on the take-up reel disk. If it is not secure, the measurement will be incorrect.
- ② Measure the torque with the torque gauge's weight exerted on the reel disk.

CHECKING THE VIDEO SEARCH REWIND BACK TENSION

- Remove the cassette housing control assembly.
- Make a connection between TP5001 and TP5002, both located at the center on your side on the main PWB, with a 22 ohm resistor. Now turn on the power.

Checking

1. Push the PLAY button to place the ass'y in the playback mode.
2. Push the rewind button to place the ass'y in the video search rewind mode.
3. Place the torque gauge on the take-up reel disk, and turn it counterclockwise very slowly (one rotation every 2 to 3 seconds) and check that the torque is within the set value $4 \pm 1.7 \text{ mN}\cdot\text{m}$ ($41 \pm 17 \text{ gf}\cdot\text{cm}$).

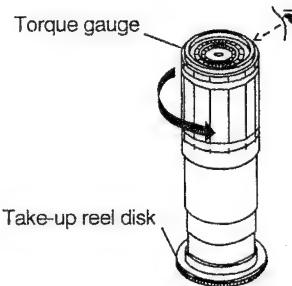


Figure 4-14.

Notes:

- ① Set the torque gauge securely on the take-up reel disk. If it is not secure, the measurement will be incorrect.
- ② Measure the torque with the torque gauge's weight not exerted on the reel disk.

CHECKING THE PINCH ROLLER PRESSURE

- Remove the cassette housing control assembly.
- Make a connection between TP5001 and TP5002, both located at the center on your side on the main PWB, with a 22 ohm resistor. Now turn on the power.

Checking

Push the PLAY button to place the ass'y in the playback mode.

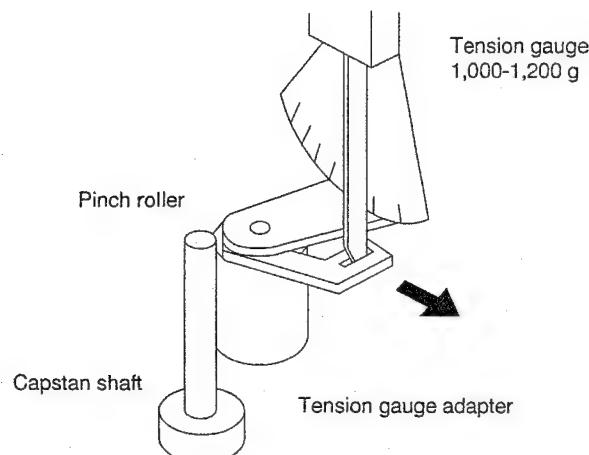


Figure 4-15.

1. Detach the pinch roller from the capstan shaft.
2. Set the tension gauge by hooking the tension gauge adapter onto the pinch roller shaft.
3. Gradually release the pressure to allow the pinch roller to touch the capstan shaft. When the pinch roller just touches the capstan shaft, read the indication on the gauge.
4. Check that the reading of the tension gauge is in the range of 900 to 1200 g.

CHECKING AND ADJUSTMENT OF TENSION POLE POSITION

- Remove the cassette housing control assembly.
- Make a connection between TP5001 and TP5002, both located at the center on your side on the main PWB, with a 22 ohm resistor. Now turn on the power.
- Setting
 1. Open the lid of cassette tape (E-180), and hold it with two pieces of vinyl tapes.
 2. Load the cassette tape into the unit.
 3. Put the weight (500g) on the cassette tape.
 4. Make the adjustment with the beginning of a E-180 tape.

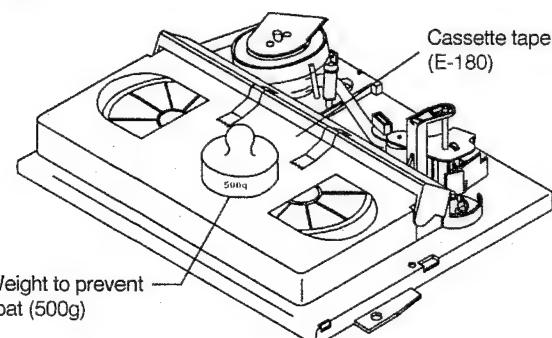


Figure 4-16.

- Checking
 1. Set a cassette tape, press the REC button and get the tape loaded. Now check the tension pole position.

2. Visually check to see if the left end of the tension pole is in alignment with the line 0.2 mm left of the center line of the SI roller. Readjust as required in the following steps.

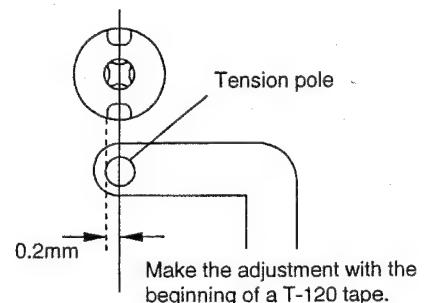


Figure 4-17.

- ① If the end is at the left from the dotted line:

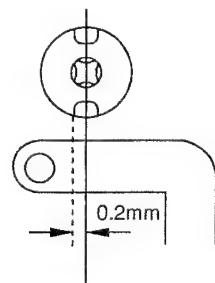


Figure 4-18.

1. Remove the cassette and press the REC button to make an empty loading. Put a bladed screwdriver into the tension band positioning cam and turn it clockwise.
2. Place the cassette in position and check the tension pole position.

- ② If the end is at the right from the dotted line:

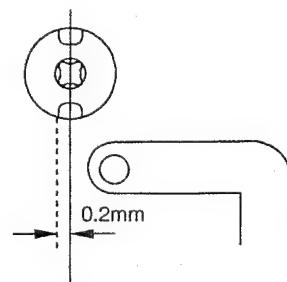


Figure 4-19.

1. Remove the cassette and press the REC button to make an empty loading. Put a bladed screwdriver into the tension band positioning cam to turn it counter-clockwise.
2. Place the cassette in position and check the tension pole position.

Notes:

- ① The tension band positioning cam cannot be adjusted with a cassette in place because the cam will be located below the cassette. Repeat a series of steps; empty loading, adjustment, cassette placement and position checking.
- ② Turn the positioning cam clockwise to move the tension pole to the right (in the black-arrow direction). Turn it counterclockwise to move the tension pole to the left (in the white-arrow direction).

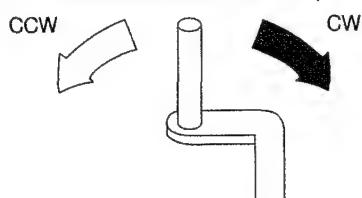


Figure 4-20.

- ③ Adjustable range of the tension pole positioning cam.

Tension arm shaft

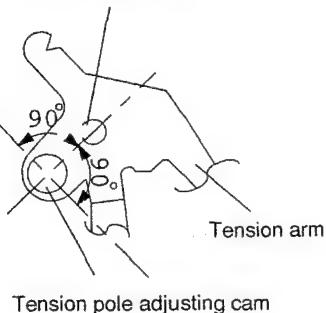


Figure 4-21.

Adjust the tension pole positioning cam so that the arrow mark on the cam be within 90° left and right from the tension arm shaft's center.

CHECKING AND ADJUSTMENT OF RECORD/PLAYBACK BACK TENSION

- Remove the cassette housing control assembly.
- Make a connection between TP5001 and TP5002 both located at the center on your side on the main PWB, with a 22 ohm resistor. Now turn on the power.
- Setting
 1. Open the lid of the cassette torque meter, and hold it with two pieces of vinyl tapes.
 2. Load the cassette torque meter into the unit.
 3. Put the weight (500g) on the cassette torque meter.

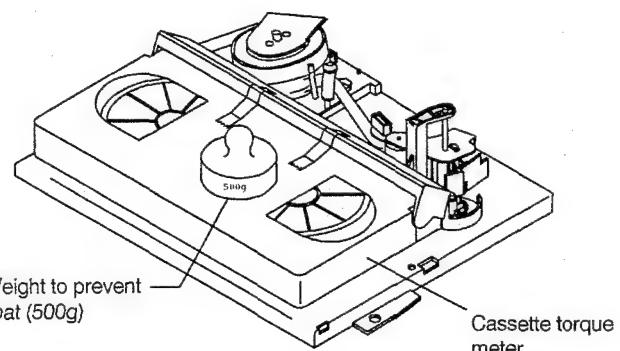


Figure 4-22.

• Checking

1. Push the REC button to place the unit in the record mode.
2. Check that the back tension indicated by the gauge is within the set range 31 to 38 g·cm.

Notes:

1. Make sure that the video cassette tape is over the retaining guide.
2. Make sure that the tape is not slack nor damaged at either end.

• Adjustment

1. If the reading of the cassette torque meter is less than specified, move the tension spring hook toward A.
2. If the reading of the cassette torque meter is more than specified, move the tension spring hook toward B.

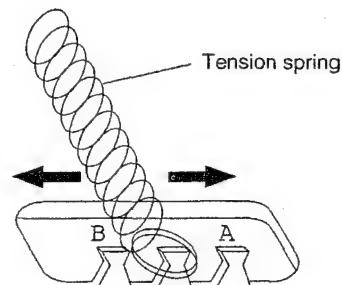
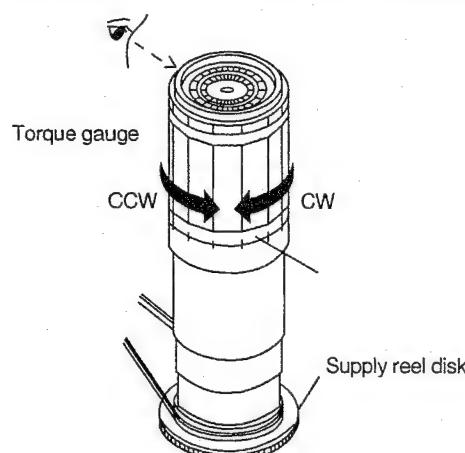


Figure 4-23.

CHECKING THE BRAKE TORQUE

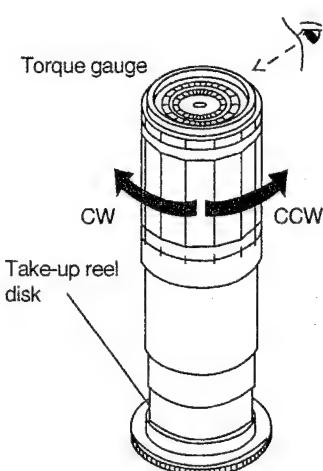
- Checking the brake torque at the supply side



CCW: 5~15mN·m (50~150gf·cm)
CW: 10~32mN·m (102~326gf·cm)

Figure 4-24.

- Checking the brake torque at the take-up side



CCW: 10~32mN·m (102~326gf·cm)
CW: 5~15mN·m (50~150gf·cm)

Figure 4-25.

- Remove the cassette housing control assembly.
- Make a connection between TP5001 and TP5002, both located at the center on your side on the main PWB, with a 22 ohm resistor. Now turn on the power.
- Setting
 1. Set a torque gauge to zero on the scale. Place it on the supply reel disk.
 2. Switch from the FF mode to the STOP mode.
 3. Disconnect the AC power plug.
- Checking
 1. Slowly rotate the torque gauge in the clockwise (CW) direction and counterclockwise (CCW) direction of the supply brake so that the reel disk and the indicator of the torque gauge rotate at an equal rate. Check that the values are within the range of CW direction = 10~32mN·m (102~326gf·cm), CCW direction = 5~15mN·m (50~150gf·cm), and that the brake torque in the CW direction is at least twice as high as that in the CCW direction.

- Remove the cassette housing control assembly.
- Make a connection between TP5001 and TP5002, both located at the center on your side on the main PWB, with a 22 ohm resistor. Now turn on the power.

• Setting

1. Set a torque gauge to zero on the scale. Place it on the take-up reel disk.
2. Switch from the FF mode to the STOP mode.
3. Disconnect the AC power plug.

• Checking

1. Slowly rotate the torque gauge in the clockwise (CW) direction and counterclockwise (CCW) direction of the take-up brake so that the reel disk and the indicator of the torque gauge rotate at an equal rate. Check that the values are within the range of CCW direction = 10~32mN·m (102~326gf·cm), CW direction = 5~15mN·m (50~150gf·cm), and that the brake torque in the CCW direction is at least twice as high as that in the CW direction.

• Adjustment of the brake torque at the supply side and the take-up side

1. If the supply or take-up brake torque is outside the range, clean the supply or take-up reel disk break lever pad, then recheck the torque.
2. If the supply or take-up brake torque is still outside the range, replace the main brake ass'y or the main brake spring.

Note:

When the main brake is replaced, perform the height checking and adjustment of reel disks (see page 17), and the brake torque checking.

REPLACEMENT OF A/C (Audio/Control) HEAD

1. Remove the cassette housing control assembly.
2. Place the unit in the unloading mode, and unplug the power cord.

• Removal

1. Loosen the tilt adjusting screw 1.
2. Remove the azimuth adjusting screw 2.
3. Remove the A/C head screw 3.
4. Unsolder the A/C head PWB soldered to the A/C head assembly.

Notes:

1. After replacement, be sure to perform the adjustment of the tape drive train (see page 26). Under any circumstances, avoid touching the head. Clean the head, if touched with your finger, with alcohol.
2. Take care that the azimuth spring does not fly off when removing the A/C head screw.

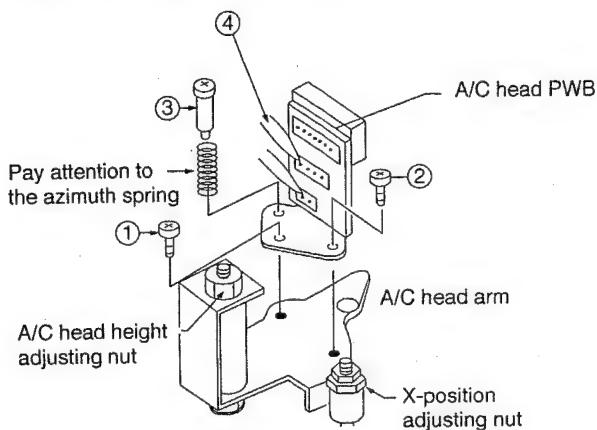


Figure 4-26.

• Replacement

1. Solder the removed A/C head PWB onto a new A/C head assembly.
2. The A/C head assembly is attached so that the A/C head arm and A/C head plate are roughly parallel to each other.

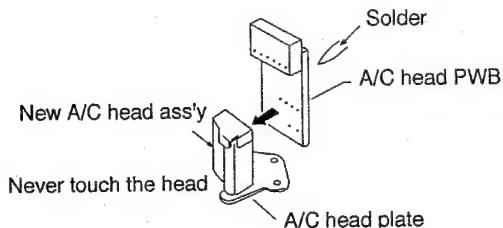


Figure 4-27.

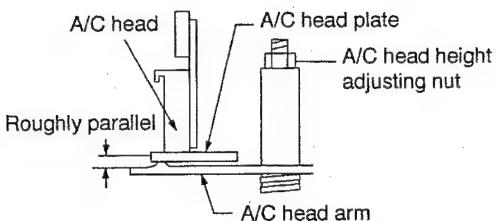
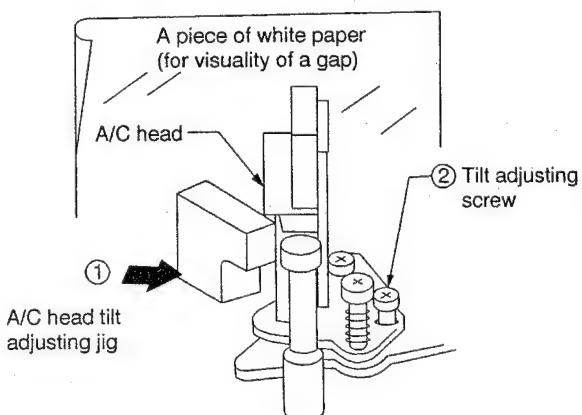


Figure 4-28.

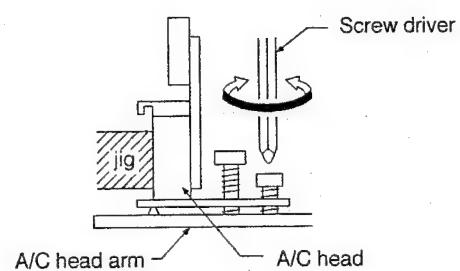
• Adjustment

[A/C head tilt angle]

1. Set the mechanism to the loading mode.
2. Place the A/C head tilt adjusting Jig ①.
3. Slowly turn the tilt adjusting screw ② with a screw driver until there is no gap between the Jig and the A/C head.



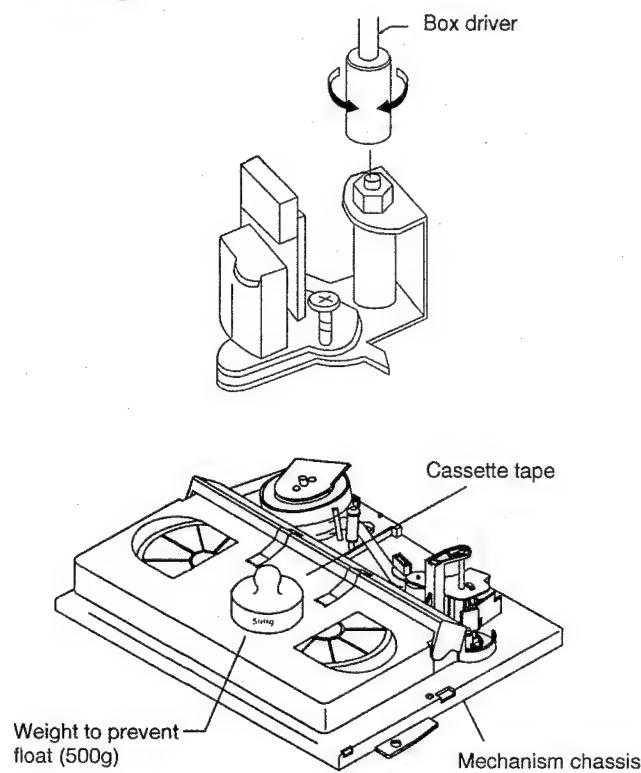
(a)



(b)
Figure 4-29.

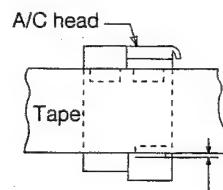
[A/C head height rough adjustment]

- Setting



- ① Roughly adjust the height of the A/C head by turning the A/C head adjusting hexagon nut with the specialized box driver until the tape is in the position shown below.
- ② Set the cassette tape to the mechanism chassis.
- ③ Press the PLAY button to put the unit in the playback mode.

- Adjustment



Adjust the nut visually so that the control head is visible 0.3 to 0.5mm below the bottom of the tape.

Figure 4-30.

HEIGHT ADJUSTMENT OF REVERSE GUIDE

[Height adjustment of reverse guide]

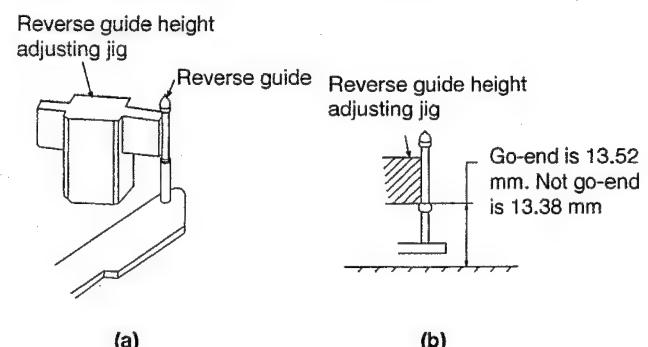


Figure 4-31.

1. In the tape load mode, make adjustment at the 13.38mm side first and then rotate the height adjusting nut by 1/6 turn counterclockwise.
2. Actually load the unit with a tape, put it in the play mode, and make sure the tape is free from wrinkles near the reverse guide.
3. Use a commercially available box driver to turn the height adjusting nut.

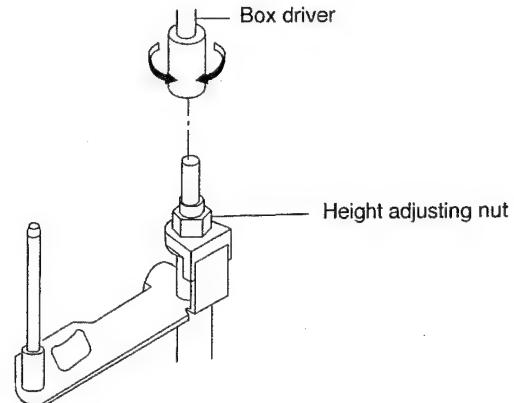


Figure 4-32.

ADJUSTMENT OF TAPE DRIVE TRAIN

1. Remove the cassette housing control assembly.
2. Make a connection between TP5001 and TP5002, both located at the center on your side on the main PWB, with a 22 ohm resistor. Now turn on the power.
3. Check and adjust the position of the tension pole. (See page 21.)
4. Check and adjust the video search rewind back tension. (See page 20.)
5. Set the tilt angle of the A/C head. (See page 24.)
6. Rough adjustment of tape drive train.
 - a) Connect the oscilloscope to the test point for PB CHROMA envelope output (TP301). Set the synchronism of the oscilloscope to EXT. The PB CHROMA signal is to be triggered by the head switching pulse (TP302).
 - b) Loosen the setscrew at the lower part of the guide roller, and adjust it with an adjusting screw driver (JIGDRIVERH-4) so that the guide roller turns smoothly. (Do not overloosen the setscrew, which causes insecurity of the guide roller.) (See Figure 4-33.)
 - c) Set the alignment tape (monoscope pattern) on the reel disk, and place the unit in the playback mode.
(Place a 500 g weight on the cassette tape to prevent floating of the cassette tape.)

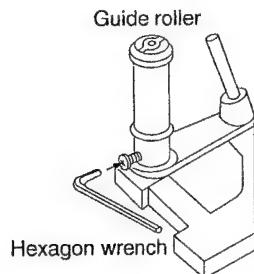


Figure 4-33.

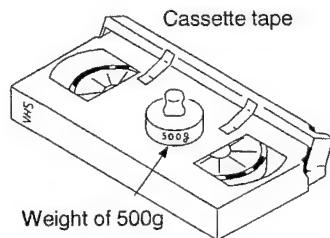
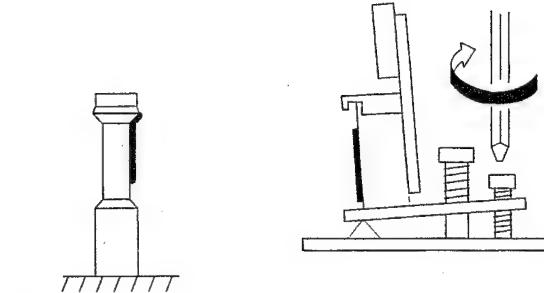
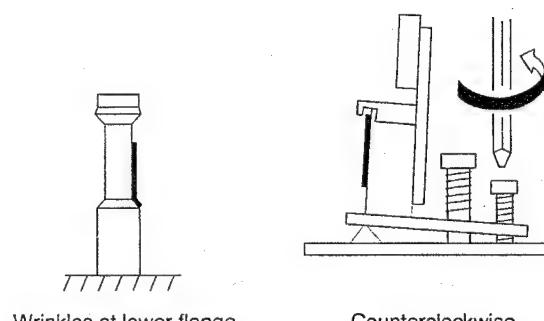


Figure 4-34.

- d) In the X value adjustment mode (see the Electrical Adjustment), change the envelope waveform from MAX to MIN, and MIN to MAX by pushing the (+) or (-) tracking button, and check a flat response is obtained on the waveform.
- e) If a flat response cannot be obtained, roughly adjust the guide rollers on the supply side and take-up side using an adjusting screw driver until a flat response can be obtained.
- f) Turn the A/C head tilt adjusting screw with a screwdriver to prevent the tape from wrinkling at the upper and lower flanges of the fixed guide.
 - 1) Wrinkles at the upper flange : Turn the above adjusting screw clockwise, as shown in Figure 4-35 (a).
 - 2) Wrinkles at the lower flange : Turn the above adjusting screw counterclockwise, as shown in Figure 4-35 (b).



Wrinkles at upper flange
(a)



Wrinkles at lower flange
Counterclockwise

(b)
Figure 4-35.

Notes:

1. Place the tracking control in the center position, and adjust the X-position adjusting nut so that the PB CHROMA envelope becomes maximum for easier rough adjustment of the tape drive train.
2. In the rough adjustment, pay particular attention to the outlet side.

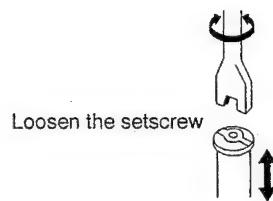


Figure 4-36.

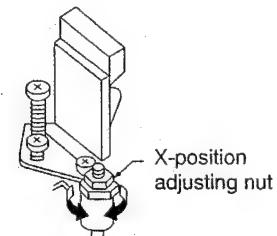


Figure 4-37.

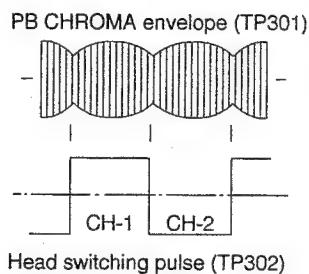


Figure 4-38.

7. Adjustment of A/C head height and azimuth

- Connect an oscilloscope to the audio output terminal.
- Use the alignment tape and play back its audio 7 kHz signal (monoscope pattern for video signal). Adjust the azimuth adjusting screw to obtain the maximum audio output on an oscilloscope. (See Figure 4-39.)
- Use the alignment tape and play back its audio 1 kHz signal (colour bar for video signal) and slowly rotate the A/C head height adjusting nut with the special box driver to obtain the maximum audio output.
- Perform the adjustment in b) again.
- After this adjustment, apply glyptal to the screws and nuts to fix them.

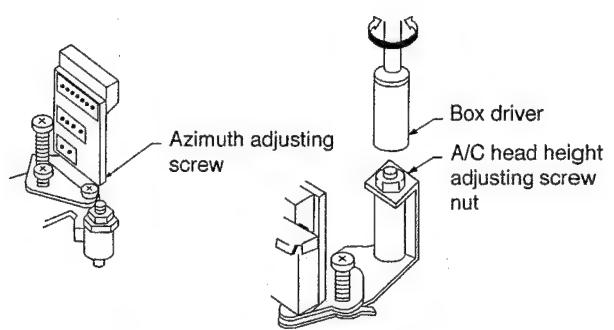


Figure 4-39.

Figure 4-40.

8. Adjustment of tape drive train and X-Position.

- Connect the oscilloscope to the test points (TP201) for PB CHROMA envelope output. Set the synchronism of the oscilloscope to EXT. The PB CHROMA signal is to be triggered by the head switching pulse (TP202).
- Play back the tape drive train alignment tape.
- Push the (+) or (-) button to change the envelope waveform from MAX to MIN, and MIN to MAX. Adjust the guide roller's height on the supply and take-up sides with an adjusting screw driver, to obtain an envelope waveform that is as flat as possible.
- If the tape is above or below the helical lead, the PB CHROMA waveform will take the shape shown in Figure 4-41.
- Adjust for maximum flatness of the envelope as the step 6, e) in page 26.

	When the tape is above the helical lead.		When the tape is below the helical lead.	
	Supply side	Take-up side	Supply side	Take-up side
Adjustment	Supply side guide roller rotated in clockwise direction (lowers guide roller) to flatten envelope.	Take-up side guide roller rotated in clockwise direction (lowers guide roller) to flatten envelope.	Supply side guide roller rotated in counter-clockwise direction (raises guide roller) to make the tape float above the helical lead. The supply side guide roller is then rotated in the clockwise direction to flatten the envelope.	Take-up side guide roller rotated in counter-clockwise direction (raises guide roller) to make the tape float above the helical lead. The take-up side guide roller is then rotated in the clockwise direction to flatten the envelope.

Figure 4-41.

- f) Push the (+) or (-) tracking button to check that a flat response is obtained on the envelope waveform.
- g) Secure the guide roller by tightening the guide roller setscrew in the unloading mode.
- h) Play back the tape drive train alignment tape to check that the envelope waveform does not change.

9. Adjustment of A/C head X-position.

- a) In the X value adjustment mode (see the Electrical Adjustment), make a connection between TP5001 and TP5002, both located at the center on your side on the main PWB, with a 22 ohm resistor to center the tracking.
- b) Rotate the X-position adjusting nut with an adjusting box driver, and adjust the A/C head position for maximum head switching pulse low side envelope.
- c) Adjust the playback switching point.
- d) Check the flatness of the envelope waveform and sound by playing back a recorded tape.

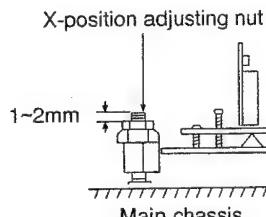


Figure 4-42.

REPLACEMENT OF THE CAPSTAN D.D. (DIRECT DRIVE) MOTOR

- Remove the cassette housing control assembly.
- Removal (Follow the order of indicated numbers.)

1. Disconnect from the board-to-board connector on the main PWB.
2. Remove the reel belt①
3. Remove the screws②.

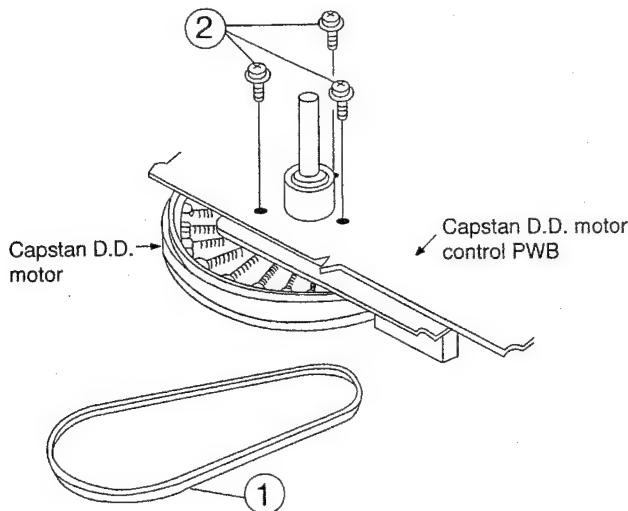


Figure 4-43.

• Reassembly

1. Mount the capstan motor on the mechanism chassis making sure not to allow the capstan shaft to hit the mechanism chassis, and attach it with the three screws.
2. Attach the reel belt. Reconnect to the board-to board connector on the main PWB.

Notes:

1. After installing the capstan D.D. motor, be sure to rotate the capstan D.D. motor and check the movement.
2. Check the servo circuit.

REPLACEMENT OF DRUM D.D MOTOR

1. Put the unit in the cassette eject position.
2. Unplug the power cord.

• Removal (Reverse the order in reassembly.)

1. Disconnect the FFC cable①.
2. Unscrew the stator assembly fixing screws②.
3. Take out the stator assembly③.
4. Unscrew the rotor assembly fixing screws④.
5. Take out the rotor assembly⑤.

Notes:

1. In removing the stator assembly, part of the drum earth spring pops out of the pre-load collar. Be careful not to lose it.
2. Secure the rotor assembly so that the installation positioning holes in the rotor assembly and upper drum assembly match. (Match the upper drum's notch with the rotor's hole.)
3. Be careful not to damage the upper drum or the video head.
4. Be sure that the hall device and the stator assembly are not damaged by the rotor assembly or other parts.
5. After installation, adjust the playback switching point.

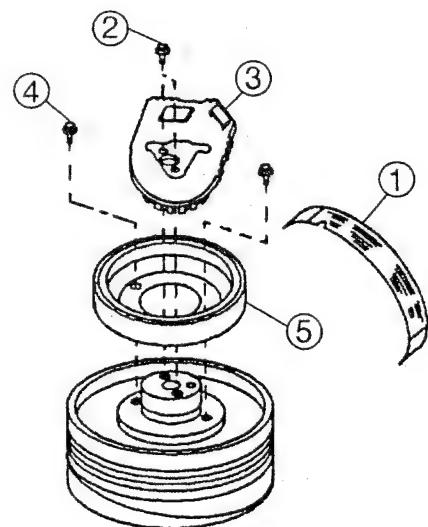


Figure 4-44

REPLACEMENT OF UPPER DRUM

(2-head/4-head drum models are applicable here. Hi-fi models are equipped with an upper-and-lower drum assembly.)

Note:

The gap between the lower drum and the upper drum is very accurate, in the order of microns, and care should be paid to their replacement. Even a slight amount of foreign material will affect the accuracy of their reassembly.

Replacement (Follow the order of the indicated numbers.)

- 1 Remove the drum earth brush and its spring 1
- 2 Put a mark for the direction of the pre-load collar and the drum shaft 2
- 3 Loosen the set screws (M4) 3 of the pre-loaded collar. Take out the pre-load collar upward.
- 4 Pull up the upper drum 4 out of position.

Note:

1. Remove the drum motor, referring to the drum motor replacement.
2. Put a mark, with a marking pen or the like, in order to identify the direction of the pre-load collar and the drum shaft. Now remove the pre-load collar.
3. Be careful not to lose the drum earth brush and drum earth brush spring.
Handle the brush with care not to allow any dust and foreign matters on it.
4. Avoid touching the drum surface with bare hands.
5. Pull out the upper drum with care so that it may not be tilted.
6. Do not hit the screws when tightening them.

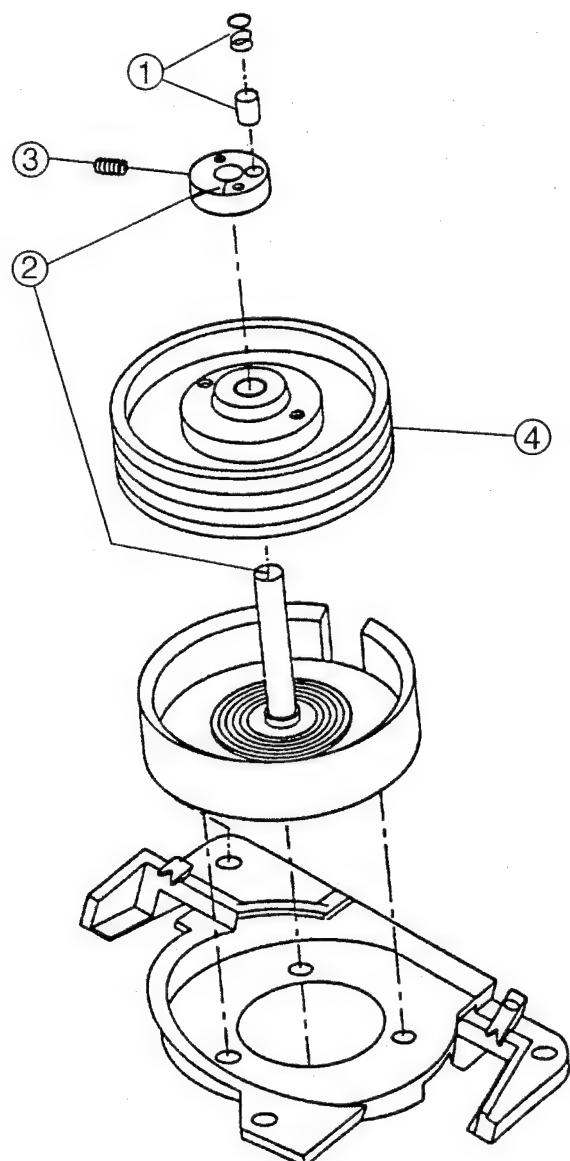


Figure 4-44(a)

Drum replacement (for 2/4 drums; drum assembly supplied for Hi-Fi models)

1. Clean up the drum shaft.
2. Make a clearance at the rotary transformer. This is an important procedure to maintain the performance.
 - 1) Some rotary transformer clearance shims are packaged in the servicing upper drum assembly or lower drum assembly. Install the thinnest (0.06mm) of the shims onto the lower drum shaft. (Refer to Fig. 4-44(b) for thickness.)
 - 2) Install the upper drum assembly onto the drum shaft.
 - 3) Install the pre-load collar.
 - 4) Exert a force of 14.7N (1.5 kgf) on the pre-load collar from above (using a commercially available load meter). Tighten up the set screws (M4) of the pre-load collar.
 - 5) Turn the upper drum by hand and listen to see if the rotary transformer gives no rubbing sound.
 - 6) If the transformer sounds, replace the installed shim with the next thicker shim.

Take the above steps 1) thru 5) until no rubbing sound is heard any longer.

- 7) Make sure no rubbing sound is heard. Finally add the 0.03mm thick shim.
3. Place the pre-load collar back in position in the direction marked in disassembling. (See Fig. 4-44(a) for setting.)
4. Exert a force of 14.7N (1.5kgf) upon the pre-load collar from above. Tighten up the set screws of the pre-load collar (1.18Nm (12 kgf-cm)).
5. Place the drum earth brush, drum earth brush spring and drum motor back in position.
6. After replacement, be sure to check the tape drive train adjustment (See page 22) and the following electric adjustments.
 Adjustment of the playback switching point.
 Checking and adjustment of the X-position.
 Adjustment of SP and LP slow tracking preset.

Precautions in drum replacement

1. The drum assembly is very delicate. Handle it with enough care.
2. Be certain that the drum surface is free from dust, dirt and other foreign matters.
3. Carefully adjust the rotary transformer clearance because this adjustment is important in order to maintain the performance.
4. Install the upper drum straight down to the drum shaft. Do not apply any excessive force upon the upper drum.

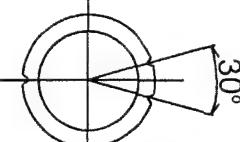
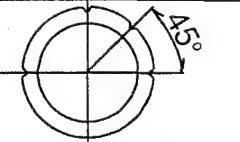
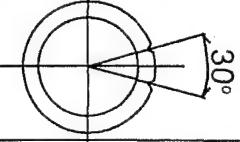
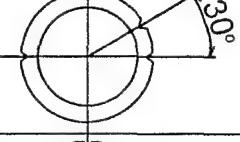
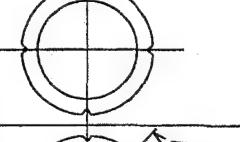
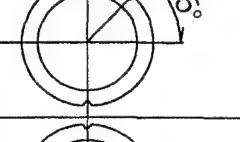
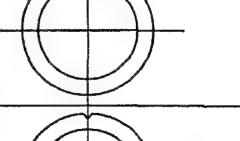
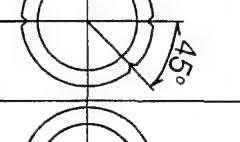
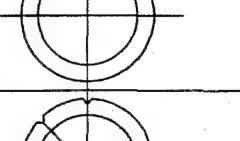
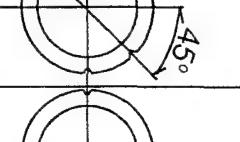
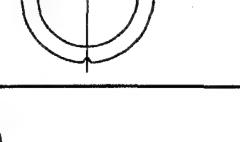
No.	Thickness (mm)	Shape
1	$t=0.080$	
2	$t=0.090$	
3	$t=0.100$	
4	$t=0.110$	
5	$t=0.120$	
6	$t=0.130$	
7	$t=0.140$	
8	$t=0.150$	
9	$t=0.160$	
10	$t=0.170$	
11	$t=0.180$	

Figure 4-44(b)

ASSEMBLE THE MECHANISM'S PARTS REQUIRING THE PHASE MATCHING IN THE STEPS BELOW.

1. Assembling the pinch roller assembly and the pinch drive cam (on the front of the mechanism chassis).
2. Mounting the shifter (on the back of the mechanism chassis).
3. Mounting the master cam (on the back of the mechanism chassis).
4. Mounting the connection gear, slow brake and loading motor assemblies (on the back of the mechanism chassis).

1. Assembling the pinch roller assembly and the pinch drive cam (on the front of the mechanism chassis).

Place the following parts in position in numerical order.

- (1) Pinch drive cam①
- (2) Pinch roller and pinch double-action lever②
- (3) Open lever③

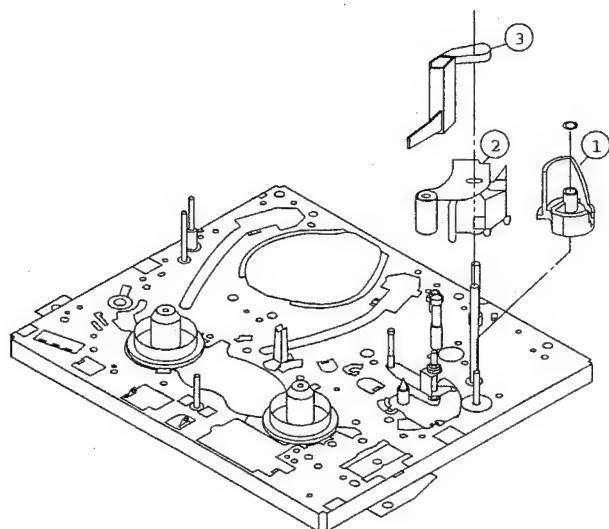
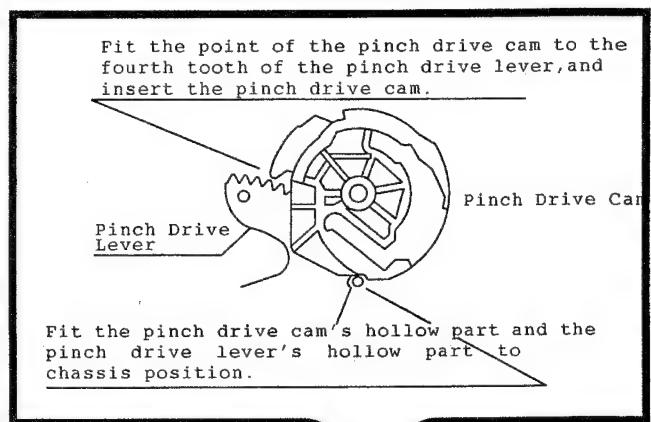


Figure 4-45.

① Insert Pinch Drive Cam.



Phase Matching Point①

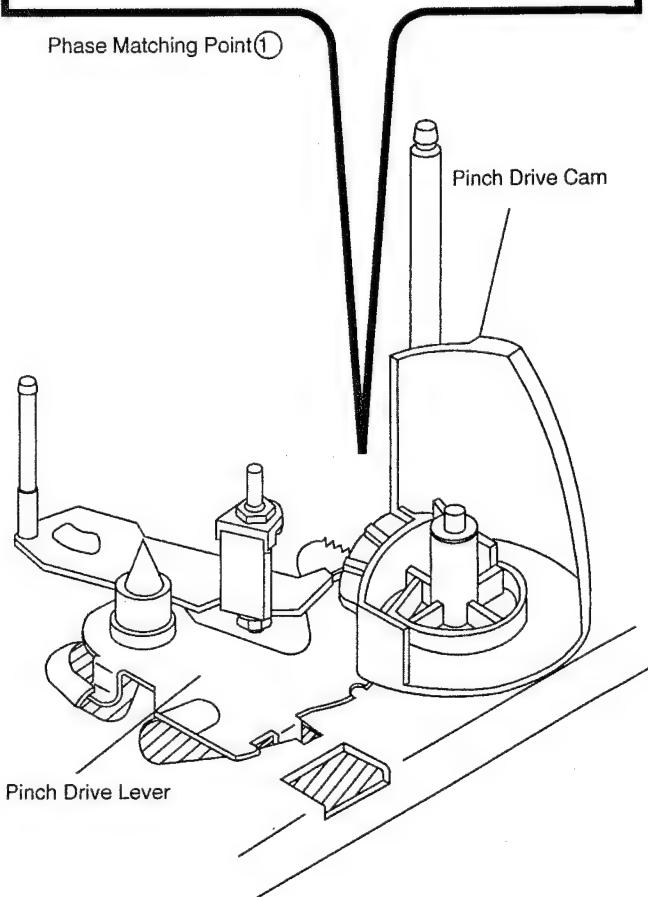


Figure 4-46-1.

② Insert Pinch Roller/Pinch Double Action Lever Ass'y.

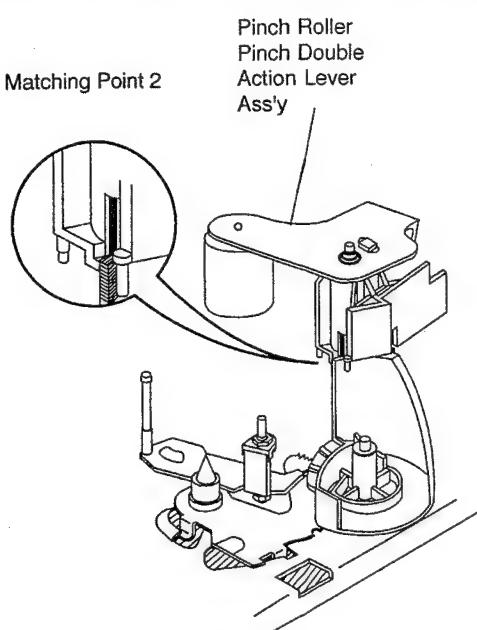


Figure 4-46-2.

③ Insert Open Lever.

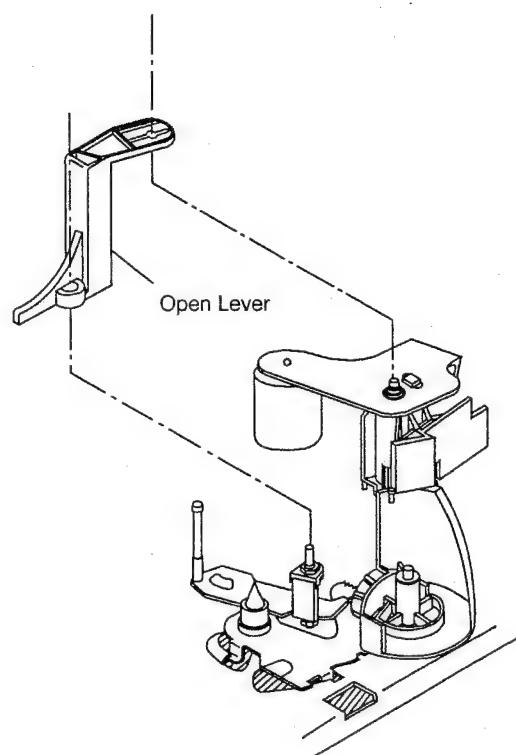


Figure 4-46-3.

2. Mounting the shifter (on the back of the mechanism chassis).

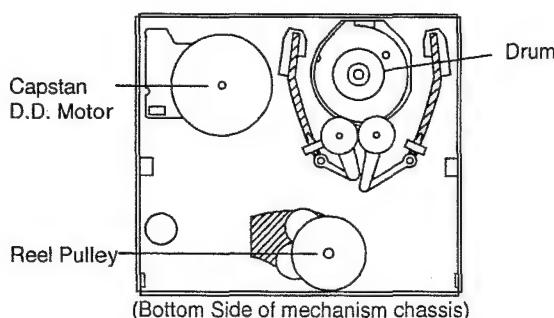


Figure 4-47.

1. Make sure that the loading gear is at the point (1) as shown below.
2. Place the shifter in position, keeping in mind the 7 insertion points and the five relief points.
3. For the phase matching at the insertion point (1), see the point (2) as shown below.
4. Finally fix the shifter with two washers located on insert points ① and ⑥.

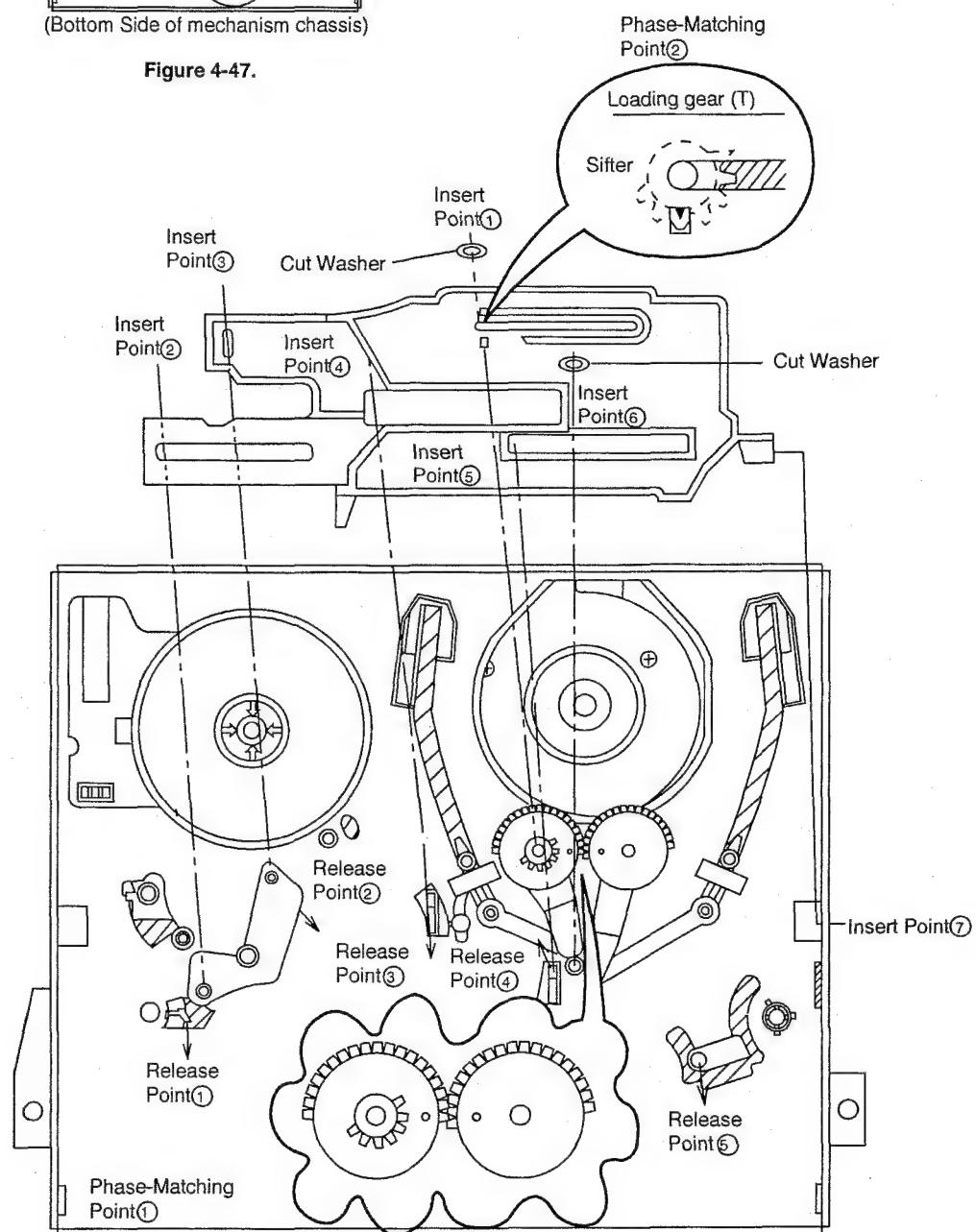


Figure 4-48.

3. Mounting the master cam (on the back of the mechanism chassis).

- (1) Make sure beforehand that the shifter is at the point as shown below.
- (2) Place the master cam in the position as shown below.

Note:
See the figure below for the phase matching between the master cam and the cassette control drive gear.
(3) Finally fix the master cam with E ring.

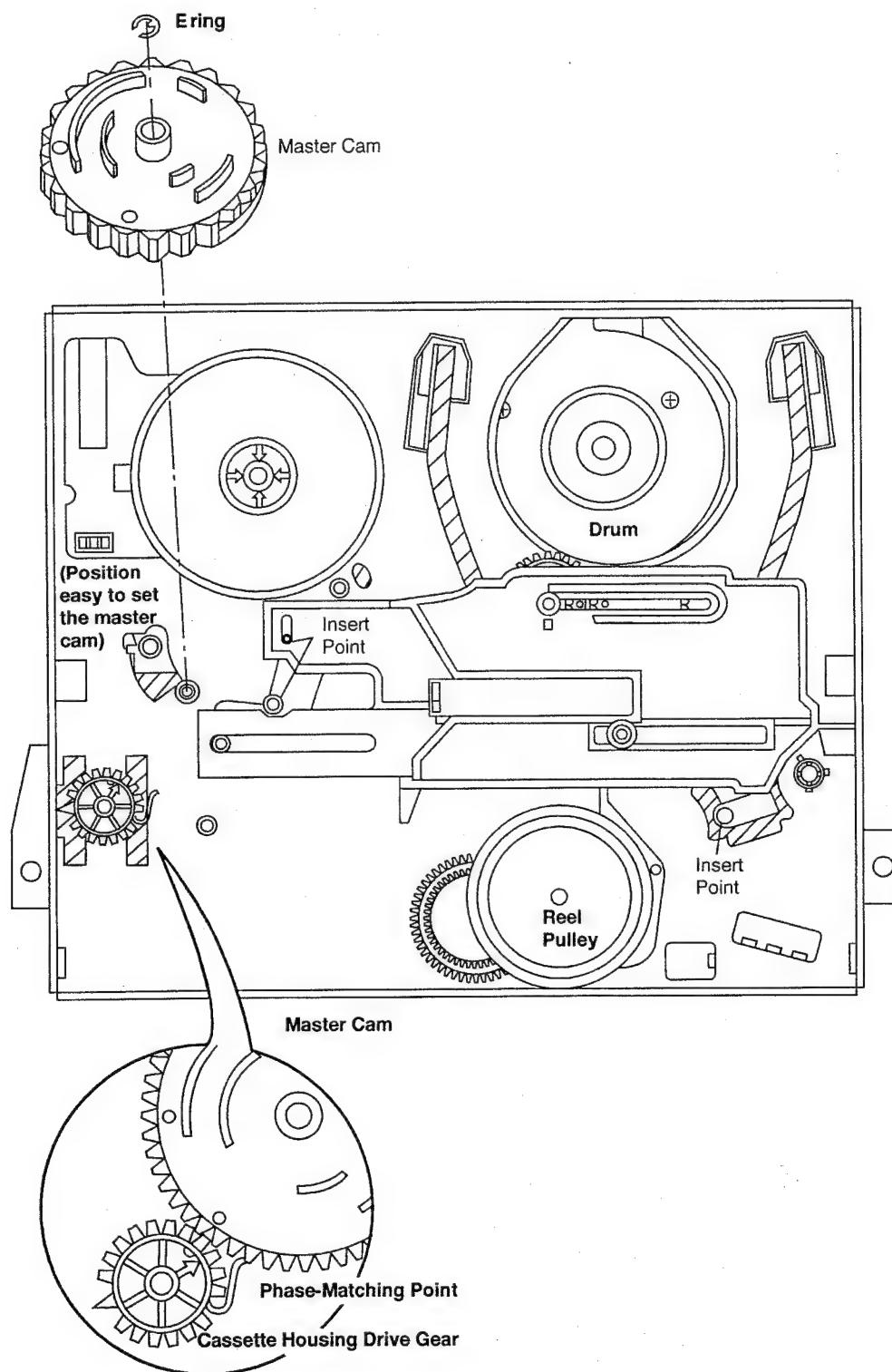


Figure 4-49.

4. Mounting the connection gear, slow brake and loading motor assemblies (on the back of the mechanism chassis).

- (1) Assemble the connect gear.
- (2) Assemble the slow brake.
- (3) Assemble the loading motor unit.

Note:

Let the slow brake leg out of the front of the mechanism chassis. Catch the spring to the take-up fixing guide that is at the left of the A/C head.

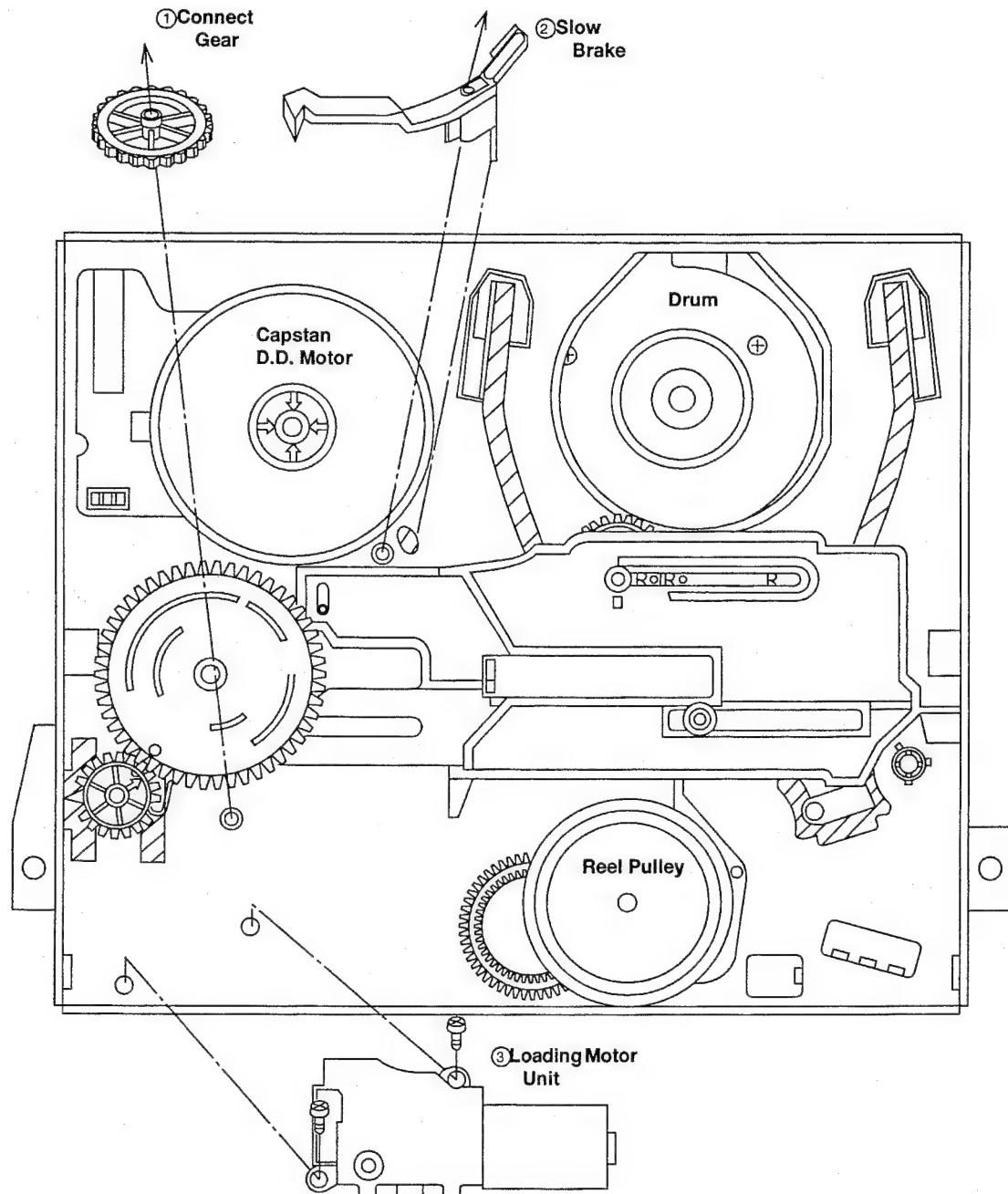


Figure 4-50.

Note:

Before setting up the loading motor, make sure the phase is matched. To do so, turn the connection gear clockwise and check to see if the loading is complete and if the pinch roller comes into contact.

When these actions are made smoothly, return the mechanism to the state as shown above. Finally mount the loading motor unit.

REPLACEMENT OF LOADING MOTOR

- Removal

Remove 2 screws.

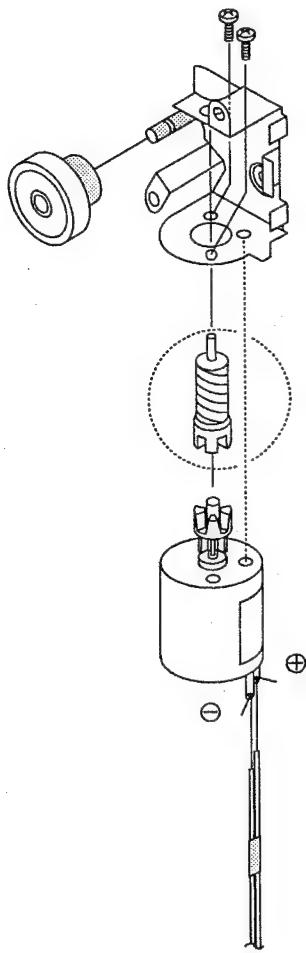
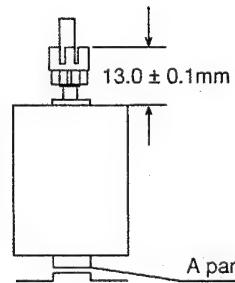


Figure 4-51.



To press the motor in,
receive it by portion A.

Figure 4-53.

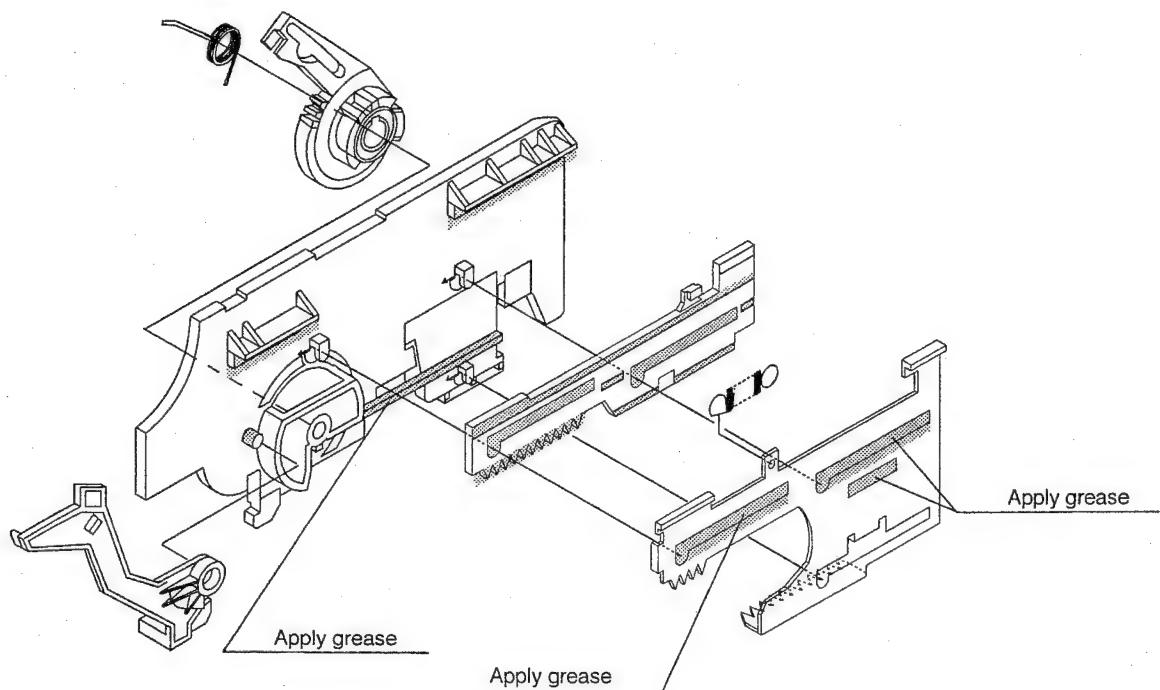
Press-fit the loading motor pulley with a force of less than 98N (10 kgf). Be sure that the pulley is 13.0 ± 0.1 mm away from the motor.

- Replacement

Take out the old loading motor. Place a replacement loading motor as shown above (Figure 4-51.).

ASSEMBLY OF CASSETTE HOUSING

① Drive Gear R and Drive Angle Ass'y



Phase Matching Point

- Fix the drive angle ass'y to the drive gear R as shown in the figure.

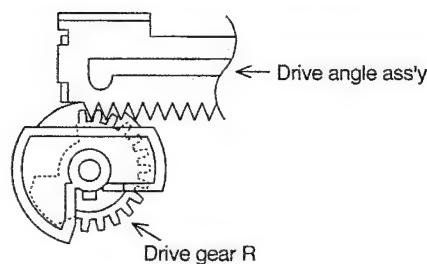


Figure 4-54.

② Synchro Gear, Drive Gear L and Drive Gear R

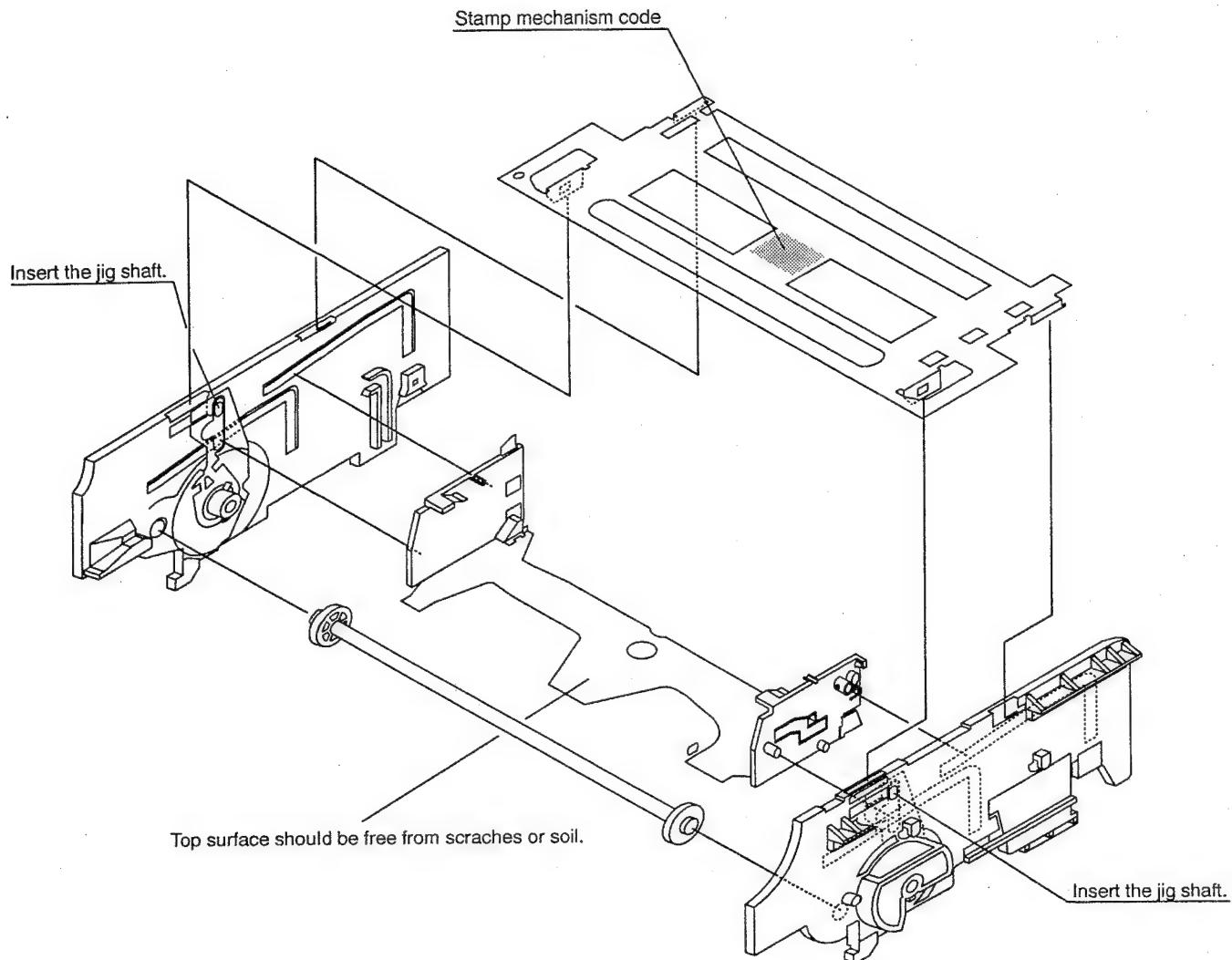
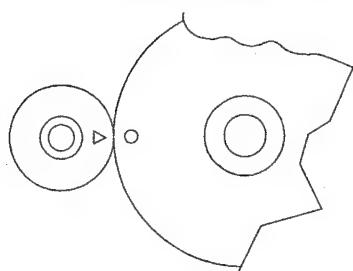


Figure 4-55.

Phase Matching Point



Align the drive gear's round hole with the synchro gear's triangular (Δ) symbol. Do this alignment for both the drive gears.

Figure 4-56.

Note:

Do not over-turn both of the drive gears when the phase has been matched. These gears are partially toothless and might come out of mesh with the synchro gear. In such a case, the phase needs rematching.

5. ELECTRICAL ADJUSTMENT

Notes:

- Before the adjustment:
Electrical adjustments discussed here are often required after replacement of electronic components and mechanical parts such as video heads.
Check that the mechanism and all electric components are in good working condition prior to the adjustments, otherwise adjustments can not be completed.

- Instruments required:

○ Colour TV monitor	○ Dual-trace oscilloscope
○ Audio signal generator	○ AC milli-voltmeter
○ DC voltmeter	○ Frequency counter
○ Blank video cassette tape	○ Alignment tape
○ Screwdriver for adjustment	○ Alignment tape
○ Colour bar signal generator	○ Alignment tape

※ Servicing precautions

When the IC804 (E²PROM) has been replaced, make the following reprogramming. Depending on models, the IC804 (E²PROM) has been factory-adjusted for its memory function.

It's therefore necessary to reprogram the memory function for the model in question.

Note that the servo circuit requires readjustments for the head switching point, slow and still modes.

- Location of controls and test points

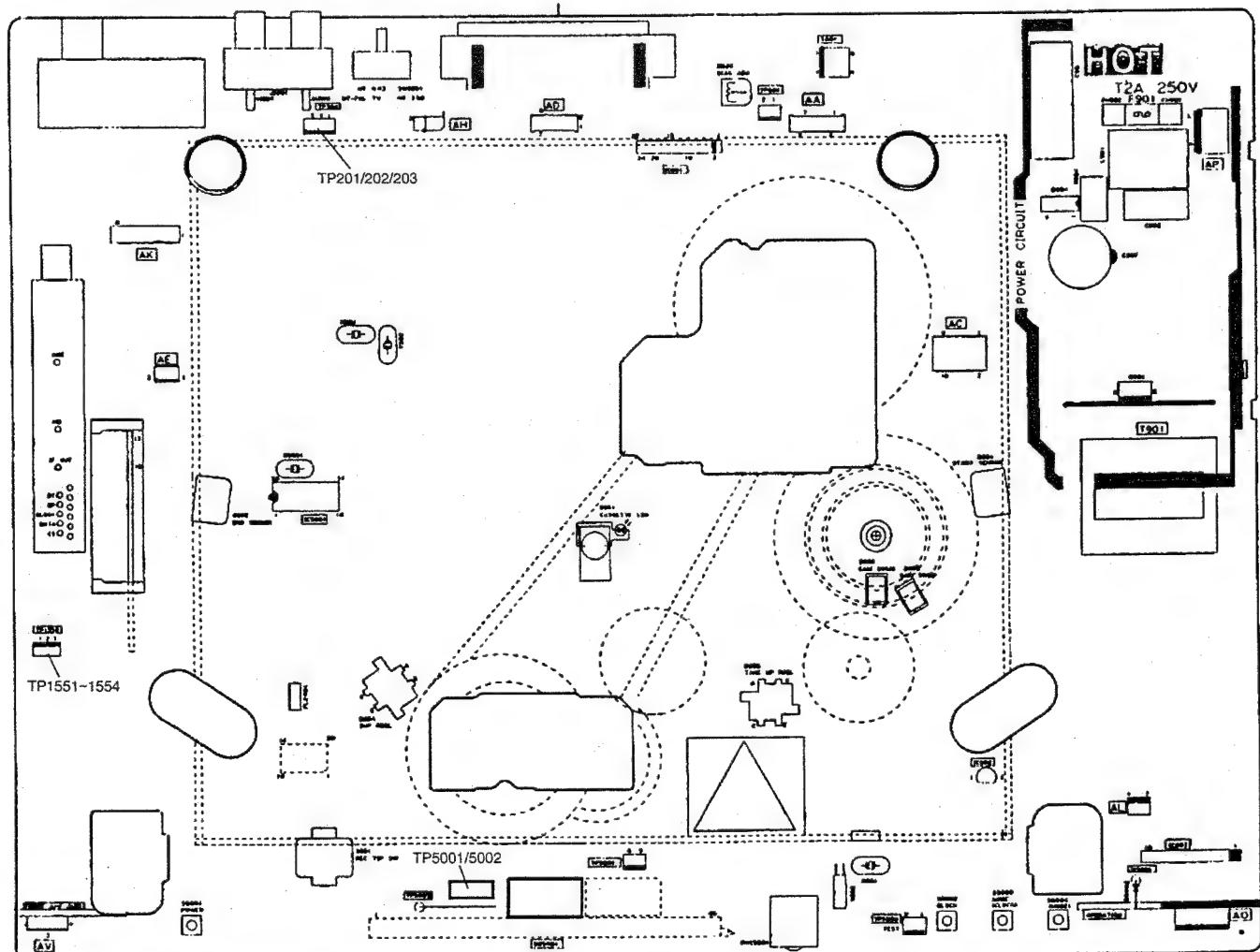


Figure 5-1.

SERVO CIRCUIT ADJUSTMENT

ADJUSTMENT OF HEAD SWITCHING POINT

Measuring instrument	Dual-trace oscilloscope Colour TV monitor
Mode	Playback
Cassette	Alignment tape (VROCPGV)
Test point	2 pin of TP201 (H.SW.P.) to CH-1, VIDEO OUT jack to CH-2 (CH-1 trigger slope switch at (+), Internal trigger at CH-1 side.)
Specification	$6.5 \pm 0.5H$ (lines)

1. Remove the front panel and play the alignment tape.
(Playback picture on the monitor screen.)
2. Press the TEST switch S5005
Be sure that all the fluorescent display tubes light up
into the TEST mode.
(See Note below)
3. Press the PLAY button.
Be sure the "PLAY" appears in the fluorescent
display tubes flashing (about 1Hz) into the auto PG
adjustment operating.

Note:

When the manual PG adjustment is made, observe
the waveform with an oscilloscope and make an
adjustment to the FF or REW button to bring into
specification.

4. Wait until the "PLAY" has stopped flashing after
adjustment.
5. Press the STOP button to return to normal mode.
6. Check the waveform on the oscilloscope screen as
shown in Figure 5-2. after the head switching point
has been adjusted.

Note:

- ① Set-up of TEST mode.
During the adjustment of HEAD SWITCHING POINT,
AUTO TRACKING function is invalid.
- ② When the cassette housing control ass'y is removed,
set-up of mechanism operating mode.
- 1) Replug the AC power cord it a few minutes later.
- 2) Make a connection between TP5001 and TP5002,
both located at the front side on the main PWB with
a 22 ohm resistor, to center the tracking.
- 3) AC power cord is plugged in.
- 4) With the AC power cord replugged, the mechanism
operating mode will resume.

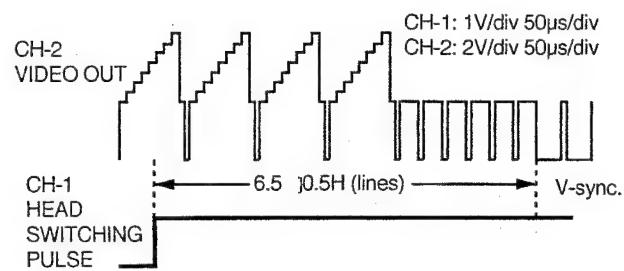


Figure 5-2.

ADJUSTMENT OF SLOW TRACKING PRE-SET (2 HEAD MODELS)

Measuring instrument	Colour TV monitor
Mode	Playback
Cassette	Self-recorded tape (See Note below)
Control	Tracking control buttons (+) or (-)
Specification	Minimized noise on monitor screen

1. Have the unit to receive a good TV broadcast or feed
a video signal to the VIDEO IN jack. (See note 2
below)
2. Record the signal on tape.
3. Rewind and play the tape where signal was recorded
in above step.
4. Press the SLOW button on the remote control, and
playback the recorded portion in the slow mode.
5. Press the TEST switch S5005
Be sure that all the fluorescent display tubes light up
into the TEST mode.
6. Look at the monitor screen and adjust the (+) or (-)
TRACKING buttons so that the noise disappears
from the screen.
7. Press the STOP button to return to normal mode.
8. Play the tape a few seconds then press the SLOW
button again and make sure there is no noise in the
screen.

Notes:

- ① Self-recorded tape means a cassette whose program
was recorded by the unit being adjusted.
- ② The TV program will not be recorded if RCA or 21pin
plugs are plugged in to the AUDIO/VIDEO input terminals.

ADJUSTMENT OF SP/LP SLOW TRACKING PRESET (4 HEAD MODELS)

Measuring instrument	Colour TV monitor
Mode	Playback
Cassette	Self-recorded tape (SP/LP mode) (See Note below)
Control	Tracking control buttons (+) or (-)
Specification	Minimized noise on monitor screen

1. Have the unit to receive a good TV broadcast or feed a video signal to the VIDEO IN jack. (See note 2 below)
2. Set the tape speed in SP mode by using the remote control and record the signal on tape.
3. Rewind and play the tape where signal was recorded in above step.
4. Press the SLOW button on the remote control, and playback the recorded portion in the slow mode.
5. Press the TEST switch S5005.
Be sure that all the fluorescent display tubes light up into the TEST mode.
6. Look at the monitor screen and adjust the (+) or (-) TRACKING buttons so that the there is noise disappears from the screen.
7. Press the STOP button to return to normal mode.
8. Play the tape a few seconds then press the SLOW button again and make sure there is no noise in the screen.
(For the LP mode put adjustment at the same adjustment way as SP mode.)

Notes:

- ① Self-recorded tape means a cassette whose program was recorded by the unit being adjusted.
- ② The TV program will not be recorded if RCA or 21pin plugs are plugged in to the AUDIO/VIDEO input terminals.

ADJUSTMENT OF FV (False Vertical Sync) OF STILL PICTURE (2 HEAD MODELS)

Measuring instrument	Colour TV monitor
Mode	Playback still
Cassette	Self-recorded tape (See Note below②)
Control	Tracking control buttons (+) or (-)
Specification	No vertical jitter of picture

1. Play a cassette which was recorded.
2. Press the PAUSE/STILL button to freeze the picture.
3. Look at the monitor screen and adjust (+) or (-) TRACKING buttons so that the vertical jitter of the picture to be minimized.
4. Play and freeze the self-recorded tape and make sure vertical jitter of the picture is not noticeable.

Note:

- ① The FV goes back to the initial state when the unit is put into the system controller reset mode due to power failure, etc.
In this case, preset the FV once again.
- ② Self-recorded tape is a cassette whose program was recorded by the unit being adjusted.

ADJUSTMENT OF FV (False Vertical Sync) OF STILL PICTURE (4 HEAD MODELS)

Measuring instrument	Colour TV monitor
Mode	Playback still
Cassette	Self-recorded tape (SP mode) (See Note below②)
Control	Tracking control buttons (+) or (-)
Specification	No vertical jitter of picture

1. Play a cassette which was recorded by the unit in SP mode.
2. Press the PAUSE/STILL button to freeze the picture.
3. Look at the monitor screen and adjust (+) or (-) TRACKING buttons so that the vertical jitter of the picture to be minimized.
4. Play and freeze the self-recorded tape in SP mode and make sure vertical jitter of the picture is not noticeable.
(For the LP mode put adjustment at the same adjustment way as SP mode.)

Note:

- ① The FV goes back to the initial state when the unit is put into the system controller reset mode due to power failure, etc.
In this case, preset the FV once again.
- ② Self-recorded tape is a cassette whose program was recorded by the unit being adjusted.

Y/C CIRCUIT ADJUSTMENT

CHECKING OF VIDEO E-E LEVEL

Measuring instrument	Oscilloscope
Mode	E-E or Record
Input signal	EIA colour bar (1.0Vp-p)
Test point	VIDEO OUT jack
Specification	$1.0 \pm 0.1\text{Vp-p}$

1. Connect a 75 ohm terminating resistor to the VIDEO OUT jack and connect an oscilloscope across this terminating resistor.
(See Note below.)
2. Feed a colour bar signal to the VIDEO IN jack.
3. Make sure that the E-E signal amplitude is 1.0Vp-p as shown in Figure 5-3.

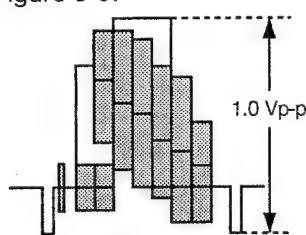


Figure 5-3.

Notes:

If the 75 ohm terminating resistor is missing, the signal amplitude will be doubled.

CHECKING OF WHITE CLIP LEVEL

Measuring instrument	Oscilloscope
Mode	E-E or Record
Input signal	EIA colour bar (1.0Vp-p)
Test point	Pin(48) of IC401, GND
Specification	$190 \pm 5\%$ (See note below)

1. Connect a oscilloscope to pin(48) of IC401 and GND.
2. Feed the colour bar signal to the VIDEO IN jack and set the unit in E-E or recording mode.
3. Make sure that the overshoot of the video signal is clipped at 190% as shown in Figure 5-4.

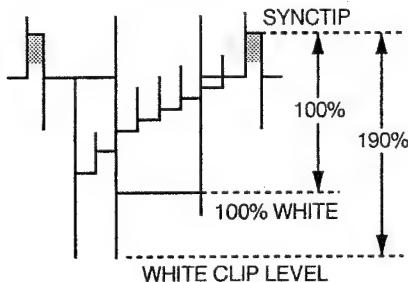


Figure 5-4.

Note:

From sync tip to white peak, the level is 100%. The white clip level is 90% above the white level.

CHECKING OF RECORD LEVEL

Measuring instrument	Dual-trace oscilloscope
Mode	Record mode
Input signal	EIA colour bar (1.0Vp-p)
Test point	Chroma (Red) R515 terminal lead at L509 side (Sig.) ~ GND Sync tip R226 terminal lead at L210 side (Sig.) ~ GND
Specification	Chroma (Red): 205~290mVp-p Sync tip: 360~440mVp-p

1. Feed the colour bar signal to the VIDEO IN jack and set the unit in recording mode.
2. Connect a dual -trace oscilloscope to each test point shown in table.
3. Make sure that the amplitude of the chrome (Red) portion and the sync tip portion are specified as shown in Figure 5-5

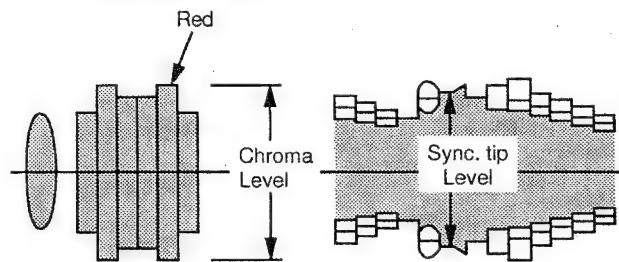


Figure 5-5 (a).

Figure 5-5 (b).

CHECKING OF PLAYBACK LEVEL

Measuring instrument	Oscilloscope
Mode	Record/Playback
Input signal	EIA colour bar (1.0Vp-p)
Test point	VIDEO OUT jack
Specification	$1.0 \pm 0.1\text{Vp-p}$

1. Be sure that E-E level has been correctly specified.
2. Connect a 75 ohm terminating resistor to the VIDEO OUT jack and connect an oscilloscope across this terminating resistor.
(See Note below.)
3. Feed a colour bar signal to the VIDEO IN jack and set the unit in recording mode.
4. Play the colour bar portion of the recorded tape.
5. Make sure that the output signal amplitude is 1.0Vp-p as shown in Figure 5-6.

Note:

If the 75 ohm terminating resistor is missing, the signal amplitude will be doubled.

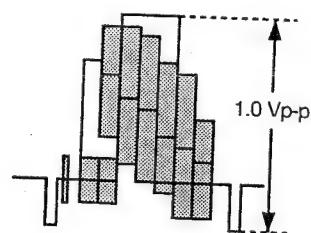


Figure 5-6.

AUDIO CIRCUIT

CHECKING OF E-E LEVEL

Measuring instrument	AC milli-voltmeter
Mode	E-E/Record
Input signal	1kHz, -8.0dBs (at RCA type jack) 1kHz, -3.8dBs (at 21pin type jack)
Test point	AUDIO OUT jack
Specification	-8.0 ± 2dBs (at RCA type jack) -3.8 ± 2dBs (at 21pin type jack)

1. Connect an oscilloscope to the AUDIO OUT jack.
2. Feed the audio signal shown in table to the AUDIO IN jack.
3. Put the unit in E-E or recording mode.
4. Make sure that the output level is value shown in table.

CHECKING OF AUDIO PLAYBACK LEVEL

Measuring instrument	AC milli-voltmeter
Mode	Playback
Input signal	Alignment tape. (1kHz level control signal.)
Test point	AUDIO OUT jack
Specification	-9 ^{+2dB} _{-1dB}

1. Playback the Alignment tape. (1kHz level audio signal)
2. Connect an AC milli-voltmeter to the AUDIO OUT jack.
3. Make sure that the output level is value shown in table.

CHECKING OF AUDIO RECORD LEVEL

Measuring instrument	AC milli-voltmeter
Mode	Record/playback
Input signal	1kHz, -8.0dBs (at RCA type jack) 1kHz, -3.8dBs (at 21pin type jack)
Test point	AUDIO OUT jack
Specification	-8.0 ± 3dBs (at RCA type jack) -3.8 ± 3dBs (at 21pin type jack)

1. Connect an oscilloscope to the AUDIO OUT jack.
2. Feed the audio signal shown in table to the AUDIO IN jack.
3. Make the self-recording and playback of the signal.
4. Make sure that the output level is value shown in table. If it's out of specified value, verify the bias current (CHECKING OF AUDIO BIAS CURRENT below).

CHECKING OF AUDIO BIAS CURRENT

Measuring instrument	AC milli-voltmeter
Mode	Record
Input signal	Not required
Test point	TP601 (+) ~ TP602 (-) (Copper side)
Specification	2.5 ± 0.1mVrms

1. Connect an AC milli-voltmeter to TP601 (+) and TP602 (-).
(Use TP602 for ground lead.)
2. Put the unit in recording mode.
3. Make sure that the AC milli-voltmeter reads 2.5 ± 0.1mVrms.

CHECKING OF ERASE VOLTAGE AND OSCILLATION FREQUENCY

Measuring instrument	Oscilloscope
Mode	Record
Test point	Full erase head
Control	T601
Specification	70 ± 5kHz, 40Vp-p or greater

1. Put the unit in recording mode.
2. Connect an oscilloscope across the full erase head.
3. Make sure the erase voltage across the full erase head is approx. 40Vp-p or more and frequency is 70 ± 5kHz.

RF CIRCUIT

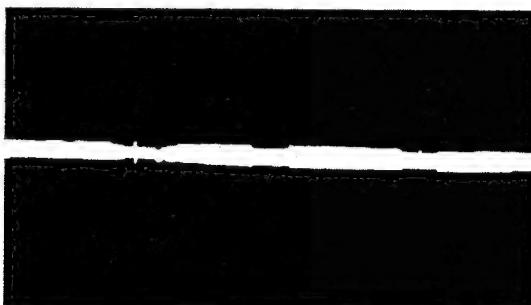
ADJUSTMENT OF RF AGC CIRCUIT (For G/S/H version)

Measuring instrument	DC voltmeter and VHF signal generator
Mode	RF signal at E12-CH (by VHF signal generator) (EBU colour bar signal at 87.5% modulated.)
Test point	TP1551 (Sig.) TP1553 (GND)
Control	VR001 AGC control
Specification	4.5 ± 0.1V

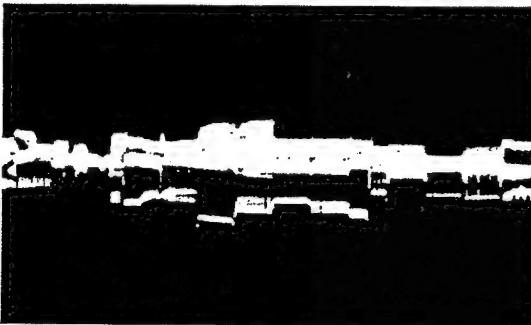
1. Receive the E12 channel signal(colour bar signal at 87.5% modulated.) at Input field strength: 70dB μ V of antenna terminal.
2. Connect a DC voltmeter to test points shown in table.
3. Adjust VR001 (AGC control) in the IF pack so that the voltage be specified.

SORT TV ADJUSTMENT PROCEDURE.

1. Tune the VCR Pr1 to the test signal. (Preferably a fixed pattern).
2. Tune the TV Pr1 to the test signal.
3. Tune the TV Pr2 to any other signal.
4. Set TV back to Pr1.
5. Select E1 on the VCR.
6. Connect an oscilloscope probe to test point TP5802.
7. Adjust R5809 until the signal level is at a minimum.



8. Select TV Pr2. Check that the signal level is greater than in Step 7 above.



Please note: The test signal on TV Pr1 and the normal signal on TV Pr2 MUST be completely different.

RF CIRCUIT

ADJUSTMENT OF RF AGC CIRCUIT (UK models only)

Measuring instrument	DC voltmeter and UHF signal generator
Mode	RF signal at I-69-CH (by UHF signal generator) (EBU colour bar signal at 87.5% modulated.)
Test point	TP1551 (Sig.) TP1553 (GND)
Control	VR001 AGC control
Specification	4.5 ± 0.1V

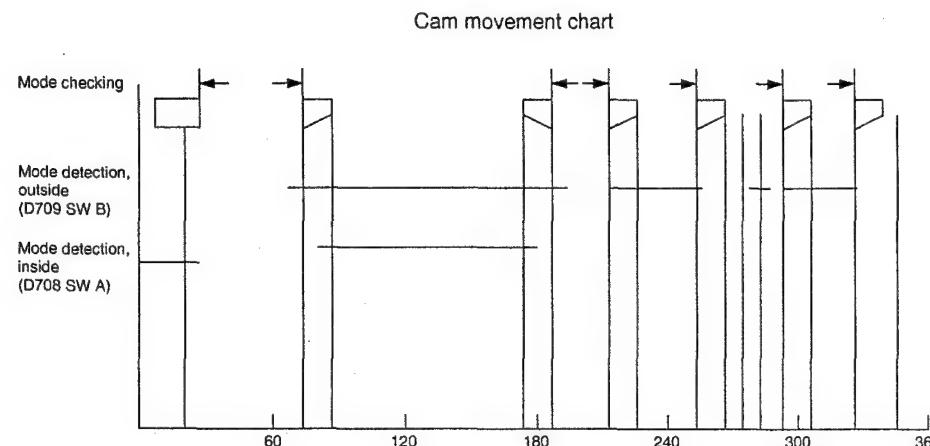
1. Receive the I-69 channel signal(colour bar signal at 87.5% modulated.) at Input field strength: 51dB μ V of antenna terminal.
2. Connect a DC voltmeter to test points shown in table.
3. Adjust VR001 (AGC control) in the IF pack so that the voltage be specified.

6. MECHANISM OPERATION FLOWCHART AND TROUBLESHOOTING GUIDE

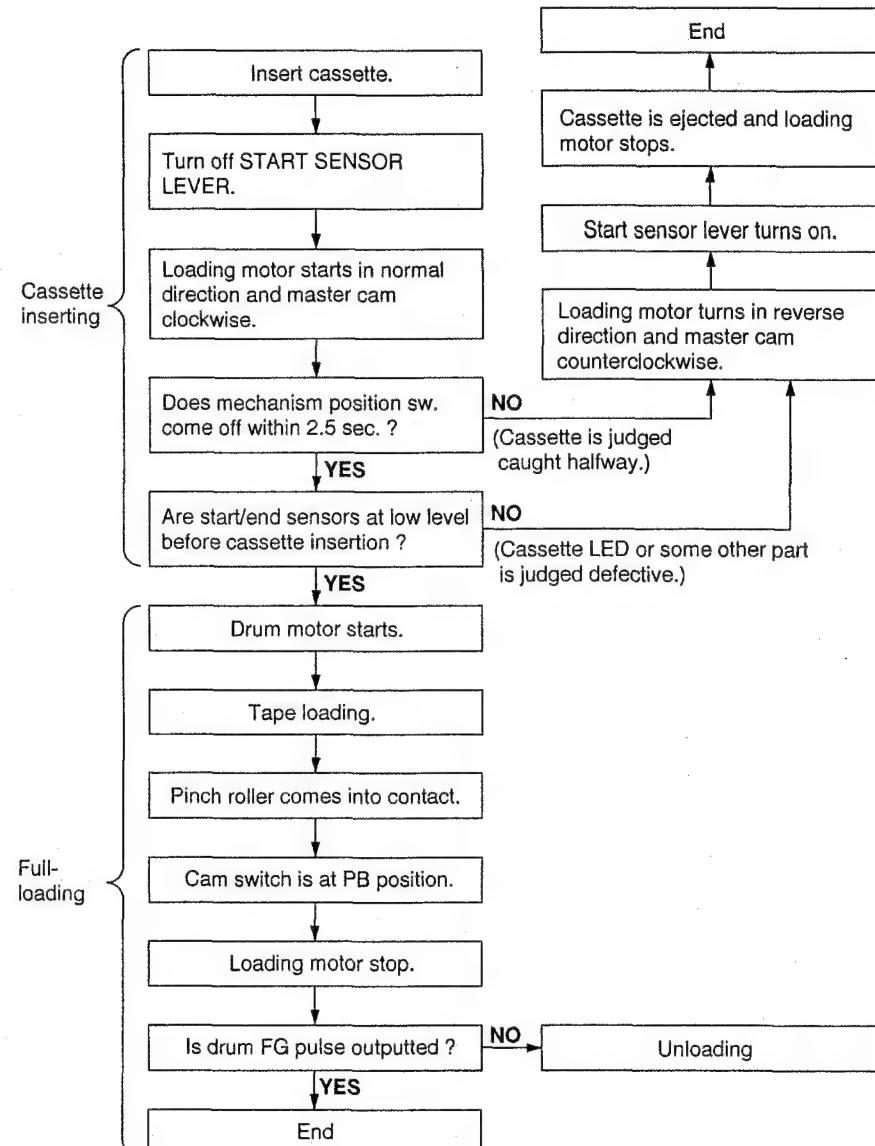
CASSETTE INSERTION / STOP

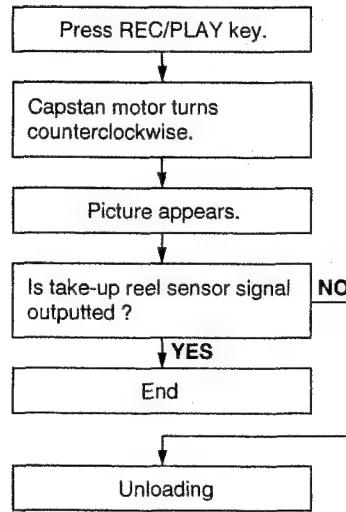
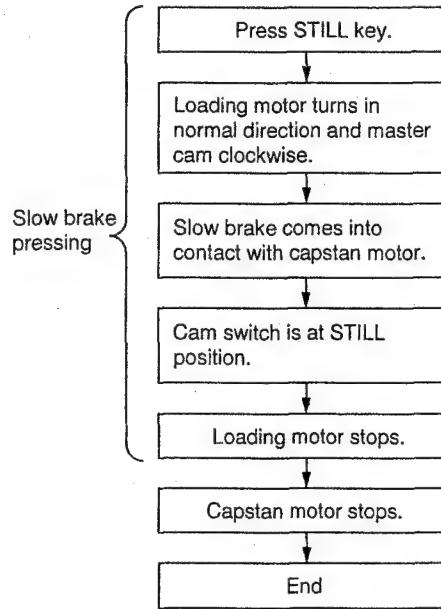
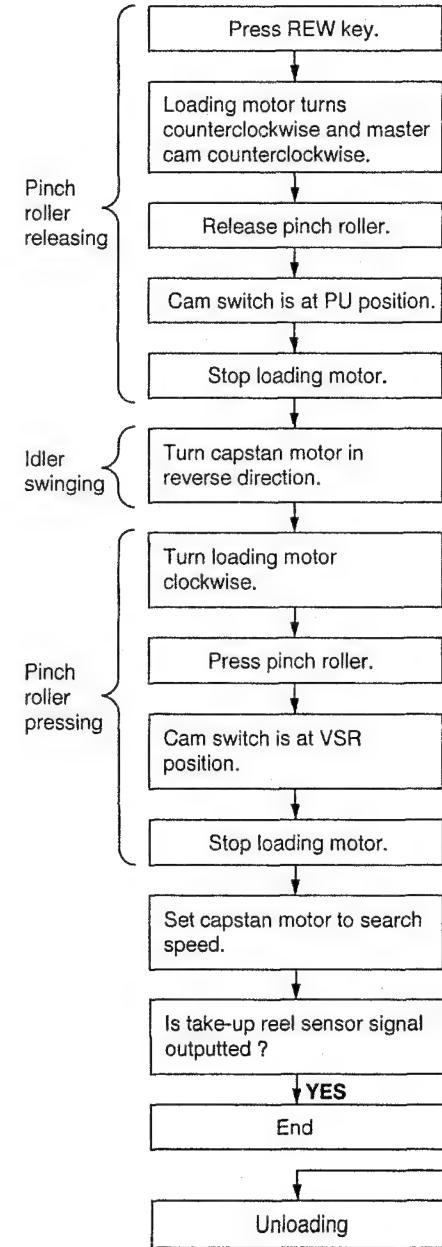
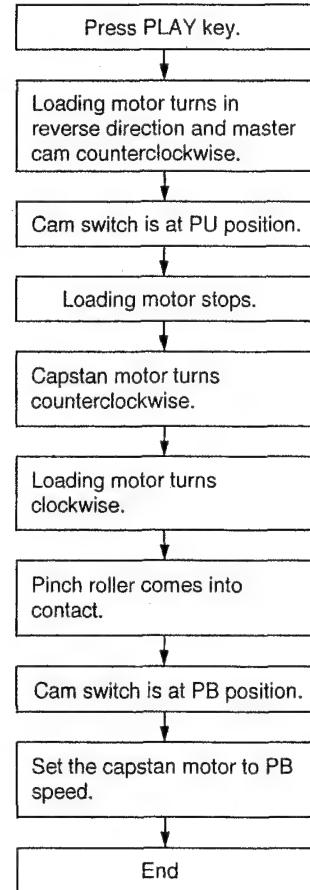
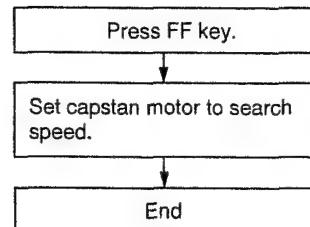
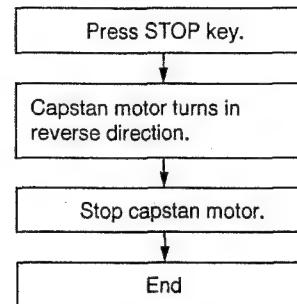
MECHANISM OPERATION FLOWCHART

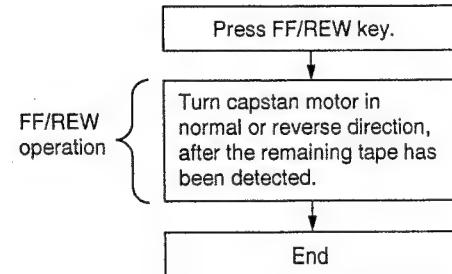
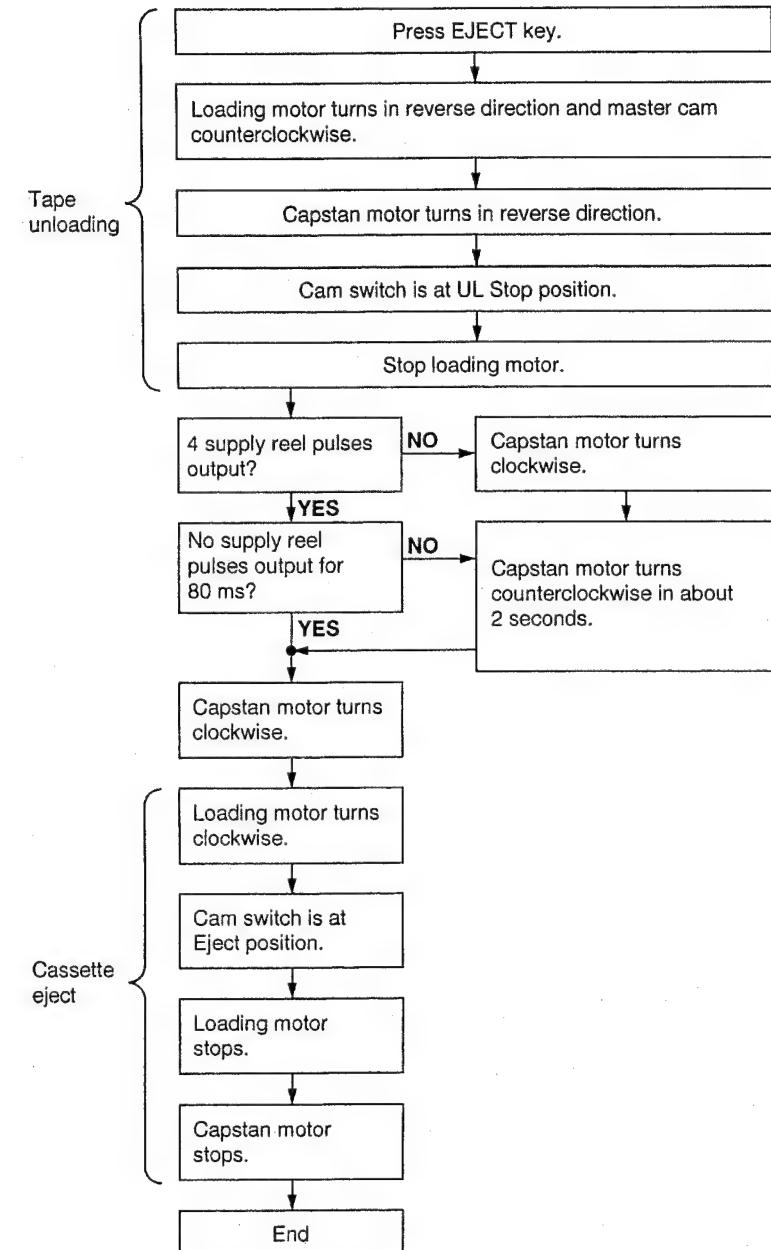
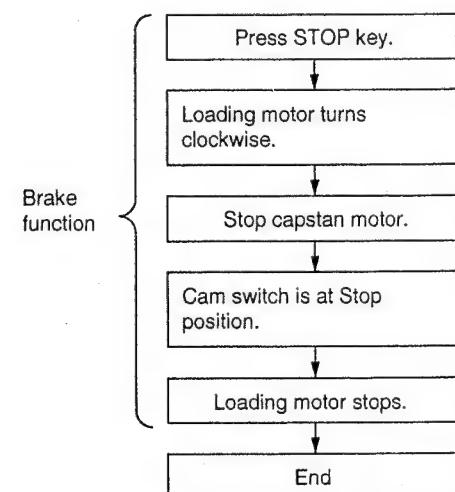
* This flowchart describes the outline of the mechanism's operation, but does not give its details.



	CS/EJ	ULD					PU LD	VSR		PB	STL	FF	STOP
Mode detection, outside	0	0	0	0	0	1	1	1	1	0	1	0	1
Mode detection, inside	1	1	0	0	0	0	1	1	0	0	0	0	0
S sensor	1	1	0	1	1 or 0								

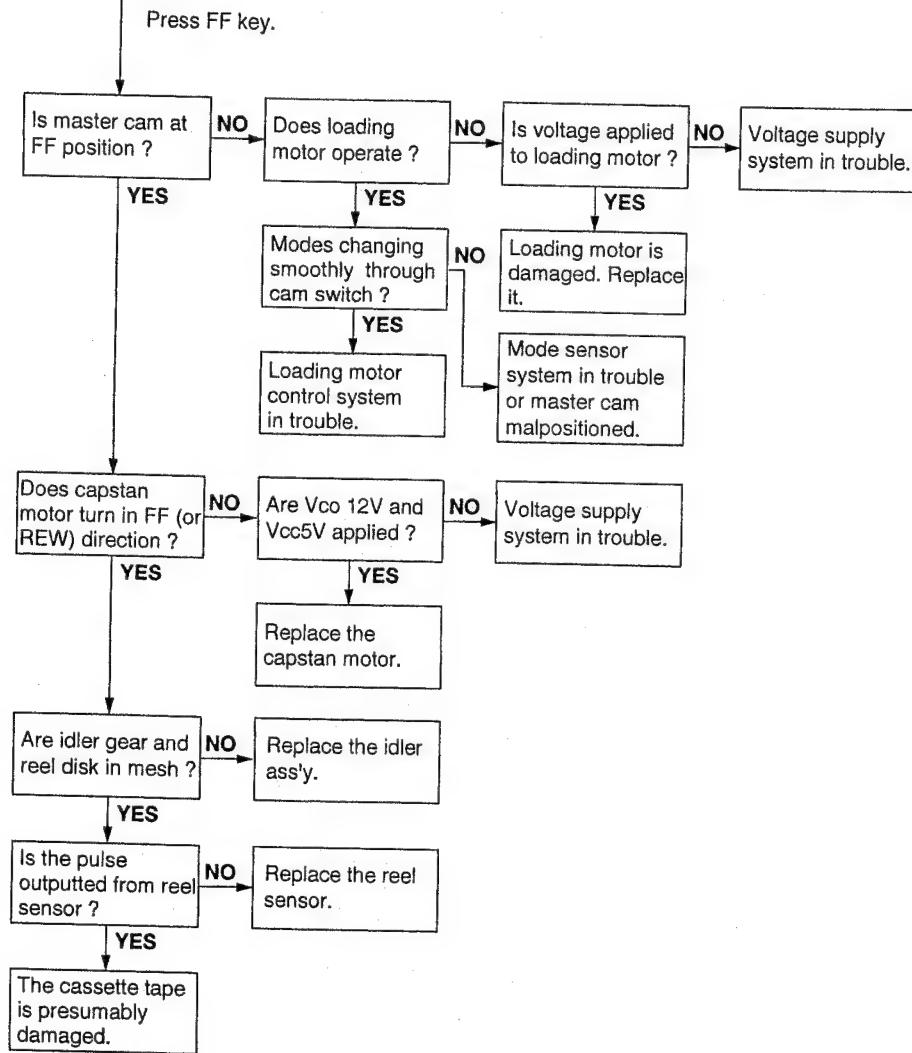


STOP / REC/PLAYPLAY / STILLPLAY / VSRVSR / PLAYPLAY / VSFREC/PLAY / STOP

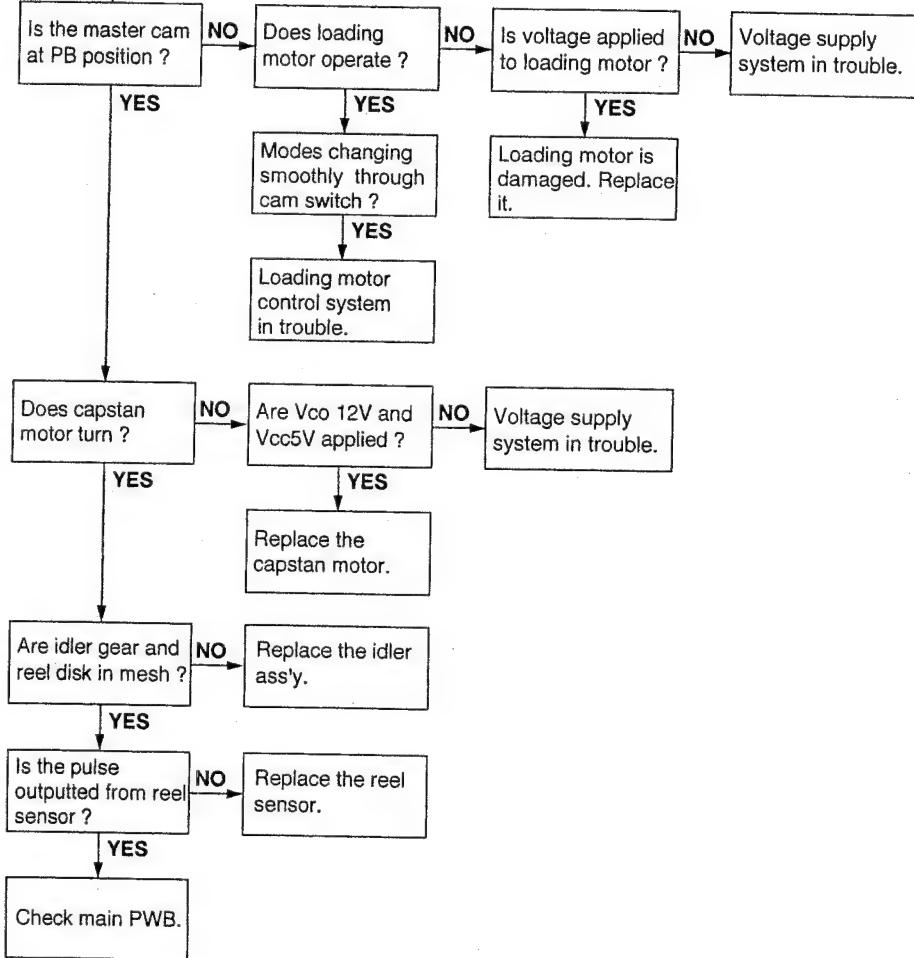
STOP / FF/REWSTOP / CASSETTE EJECTFF/REW / STOP

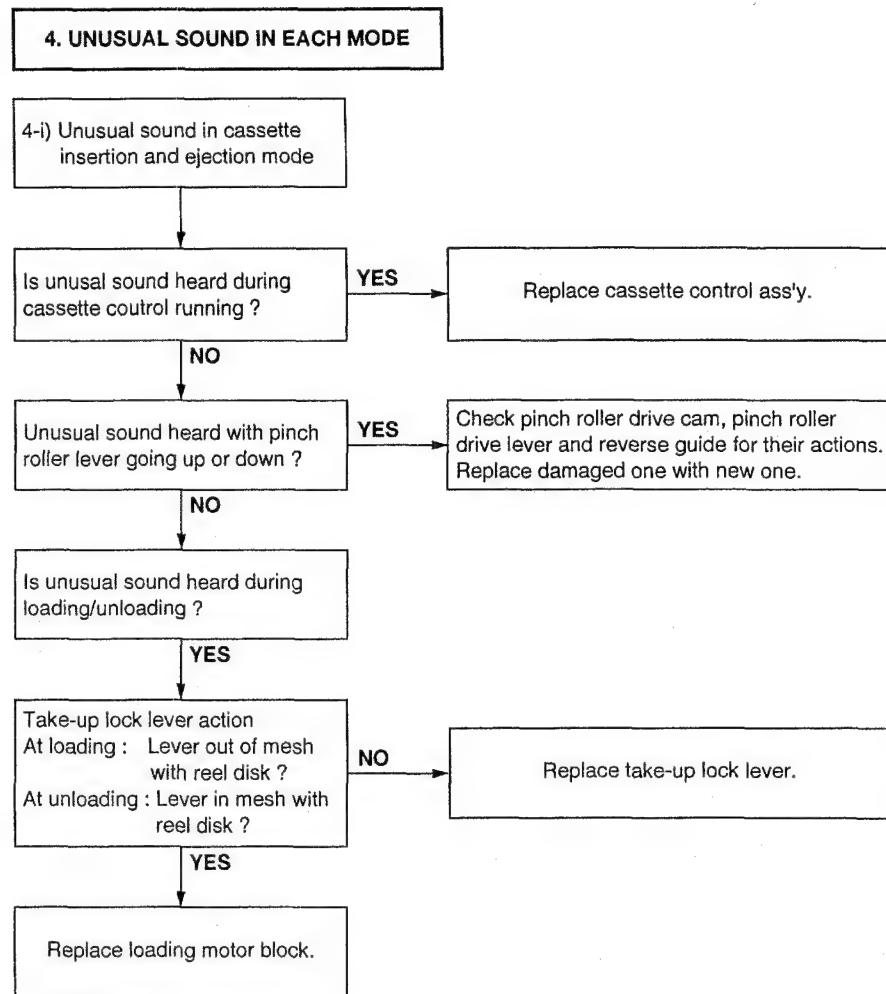
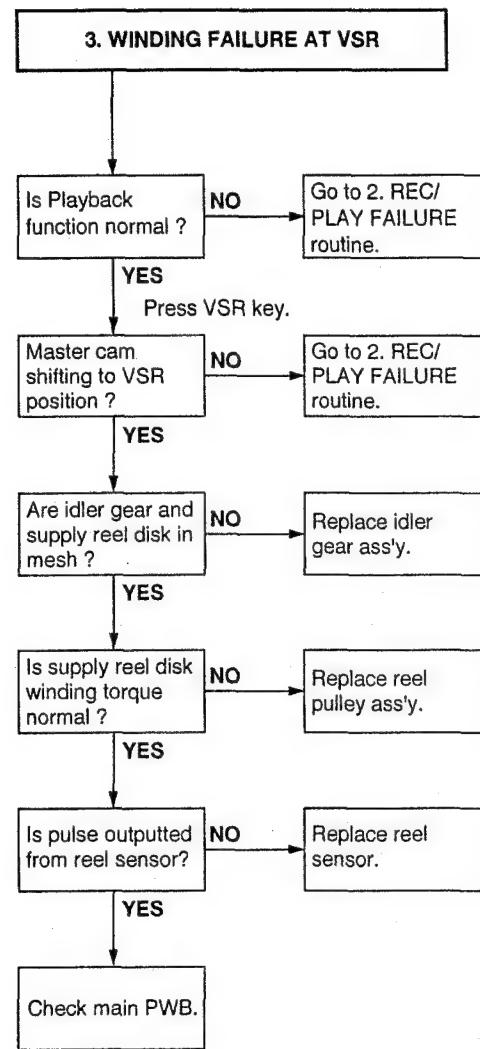
MECHANISM TROUBLESHOOTING

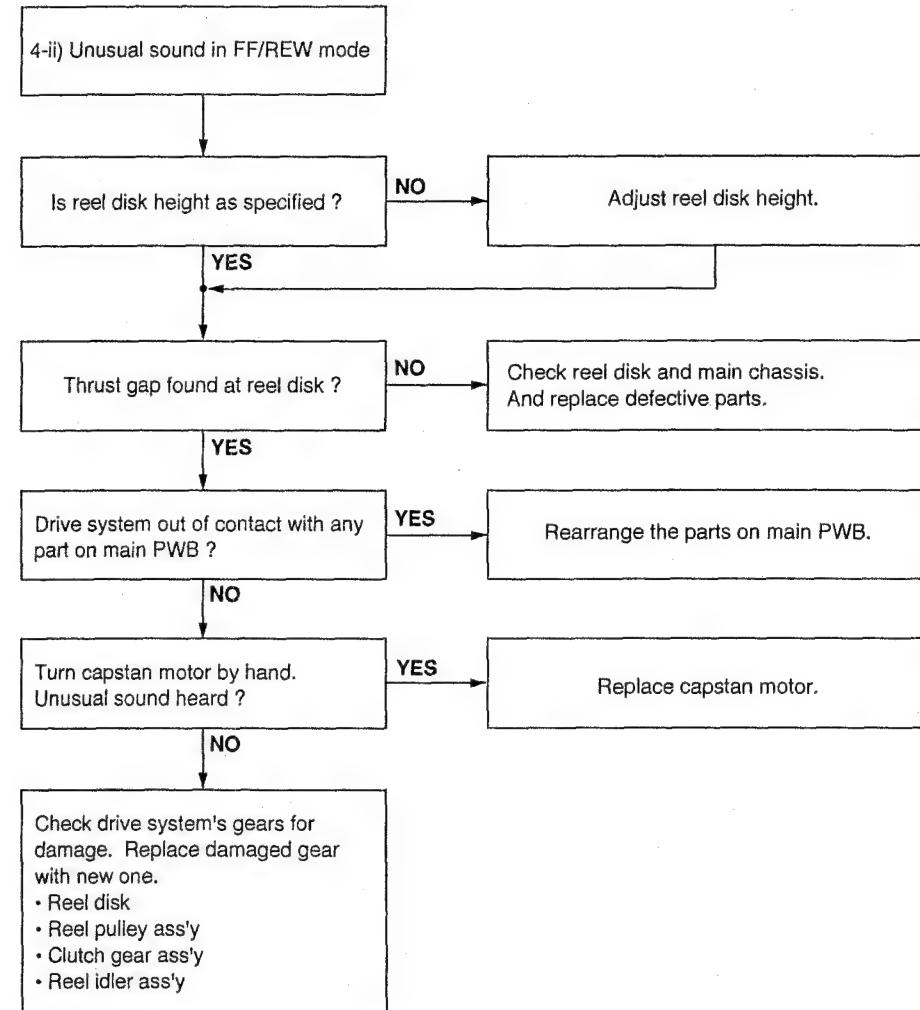
1. FF/REW FAILURE (NO TAPE WINDING)



2. REC/PLAY FAILURE (MODE RELEASE)

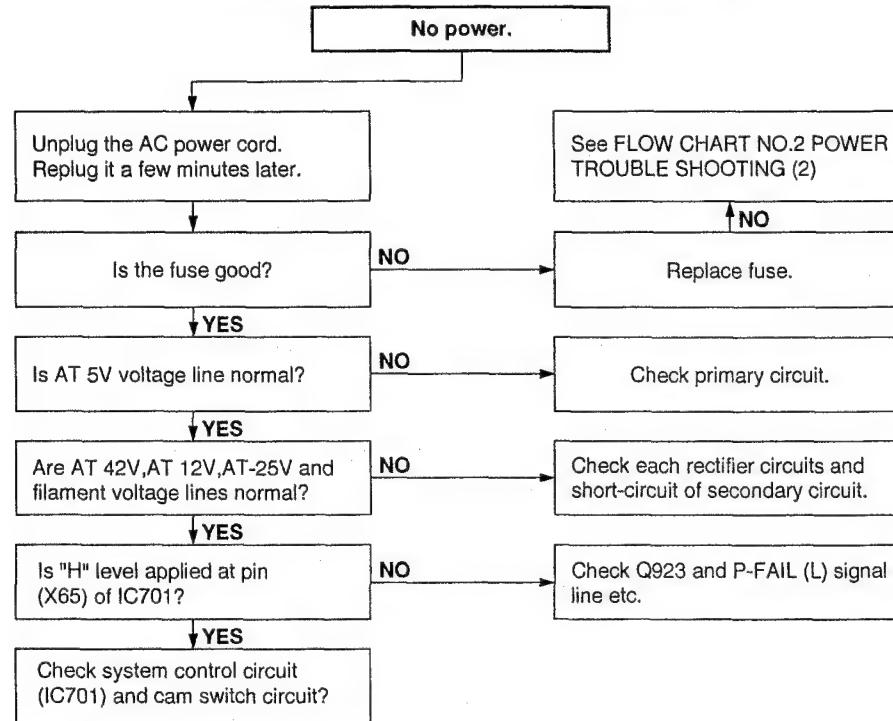






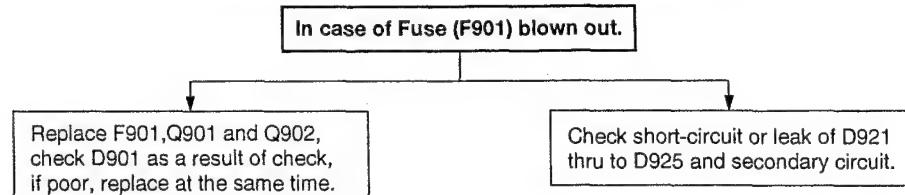
7. TROUBLESHOOTING

FLOW CHART NO.1 POWER TROUBLESHOOTING (1)

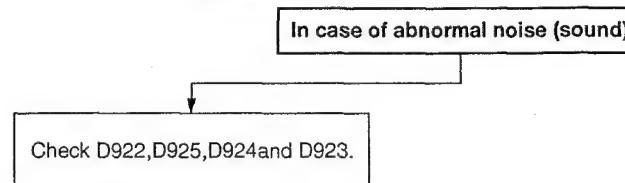


50

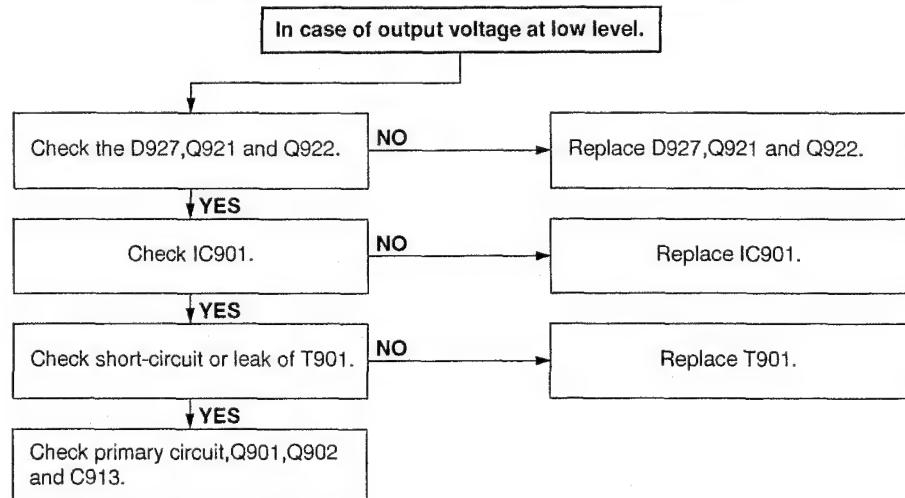
FLOW CHART NO.2 POWER TROUBLESHOOTING (2)



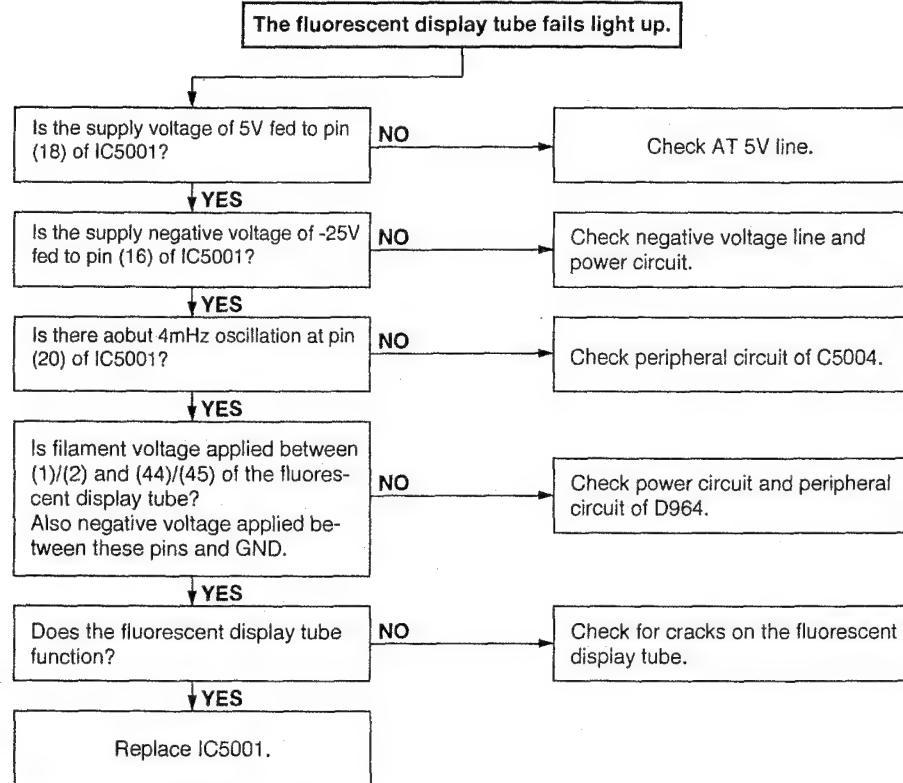
FLOW CHART NO.3 POWER TROUBLESHOOTING (3)



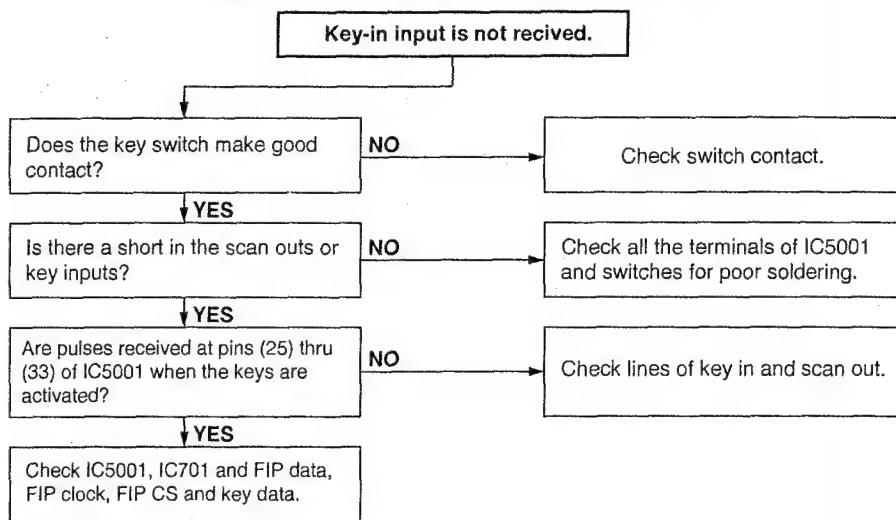
FLOW CHART NO.4 POWER TROUBLESHOOTING (4)



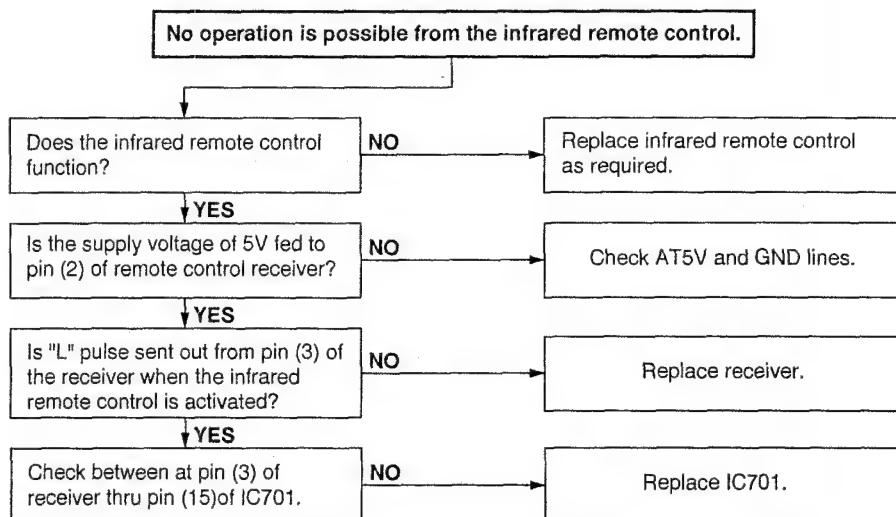
FLOW CHART NO.5 TIMER (1) TROUBLESHOOTING



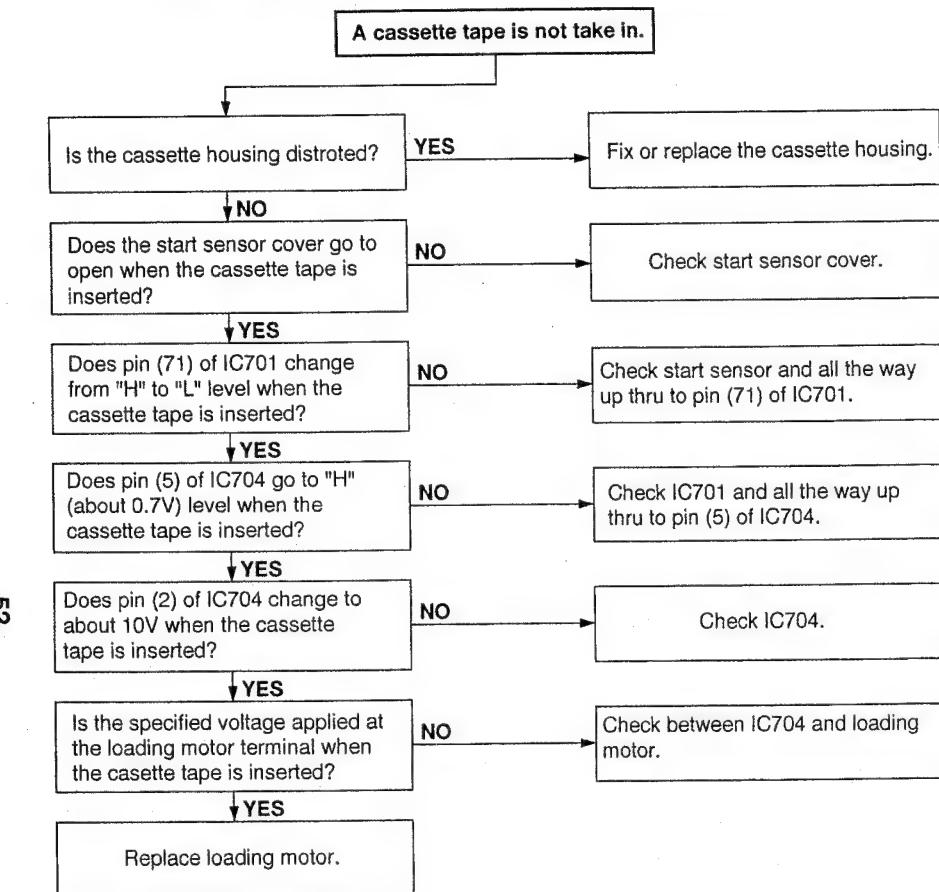
FLOW CHART NO.6 TIMER (2) TROUBLESHOOTING



FLOW CHART NO.7 INFRARED R/C TROUBLESHOOTING

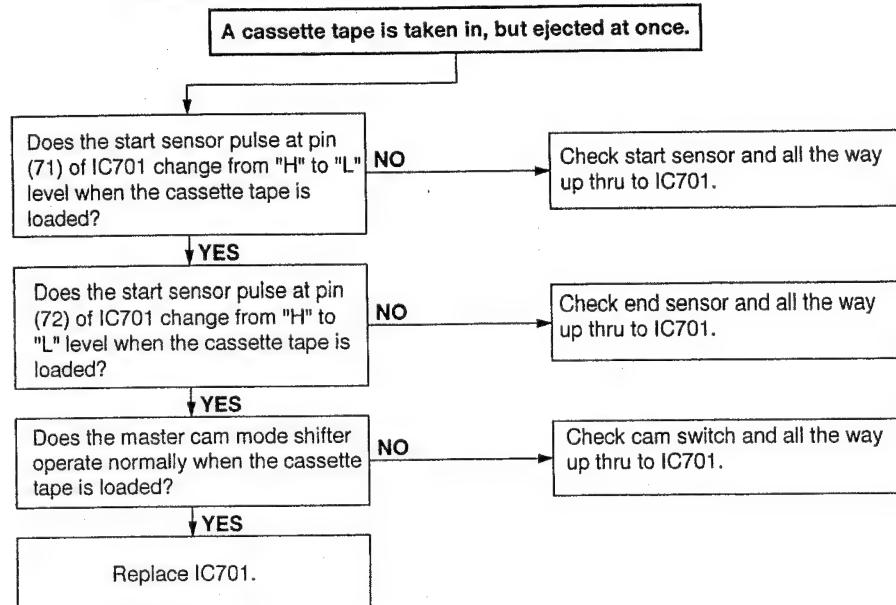


FLOW CHART NO.8 CASSETTE CONTROL TROUBLESHOOTING(1)

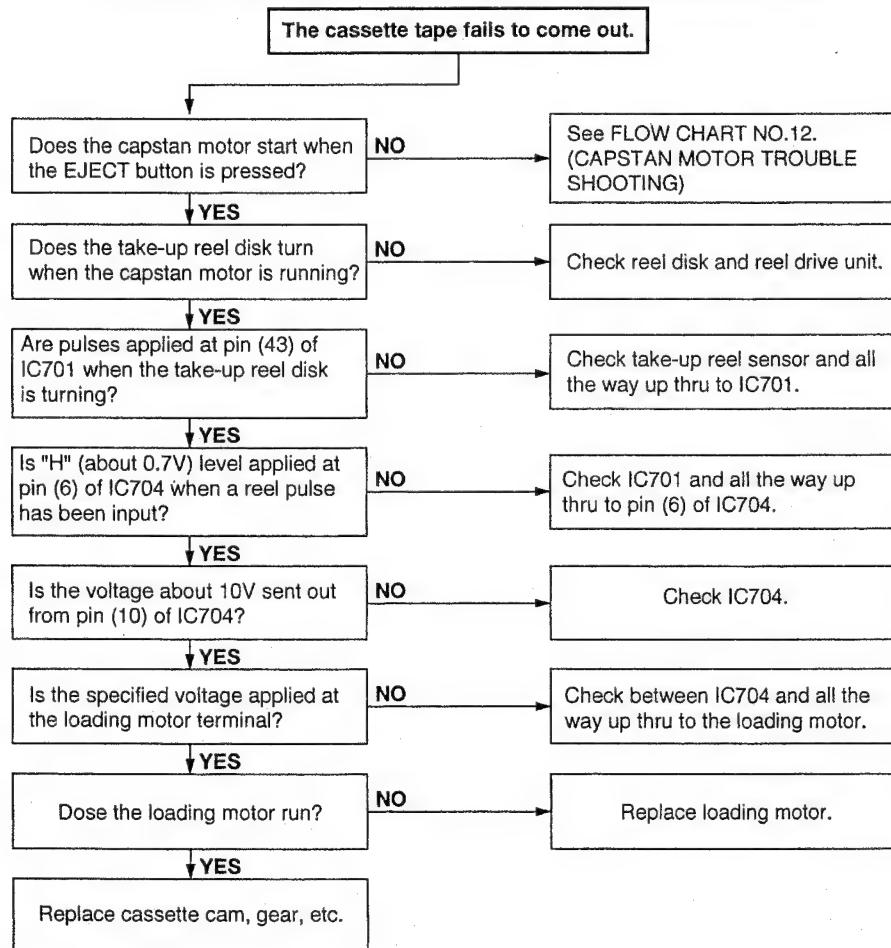


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FLOW CHART NO.9 CASSETTE CONTROL TROUBLESHOOTING (2)

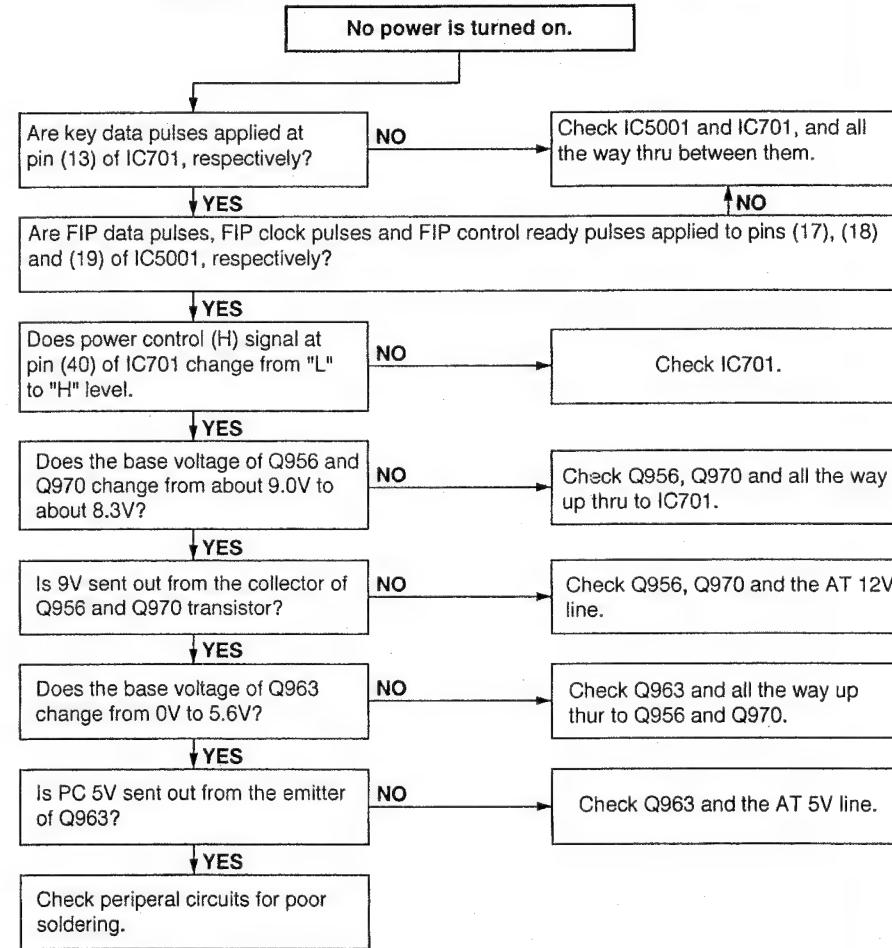


FLOW CHART NO.10 LOADING MOTOR AND EJECT TROUBLESHOOTING

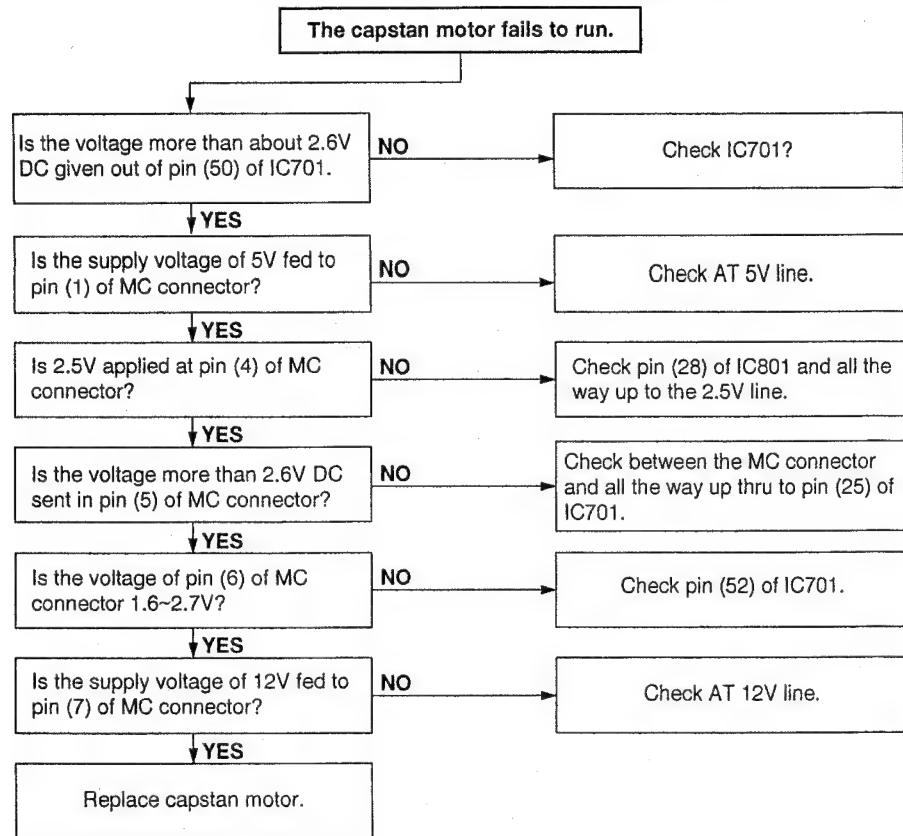


53

FLOW CHART NO.11 SYSTEM CONTROL TROUBLESHOOTING

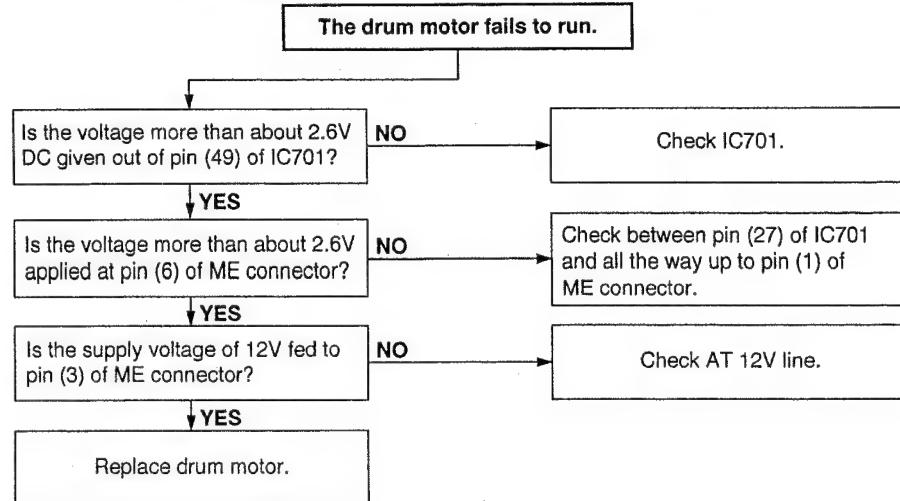


FLOW CHART NO.12 CAPSTAN MOTOR TROUBLESHOOTING

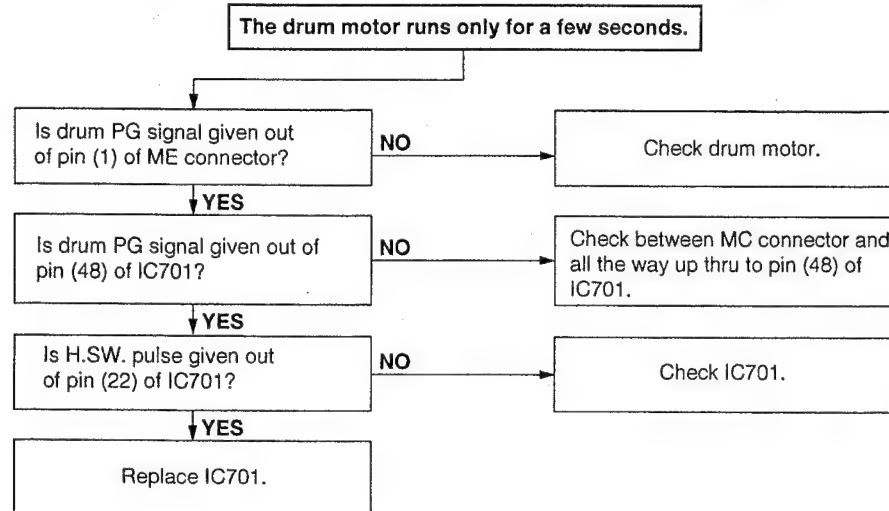


54

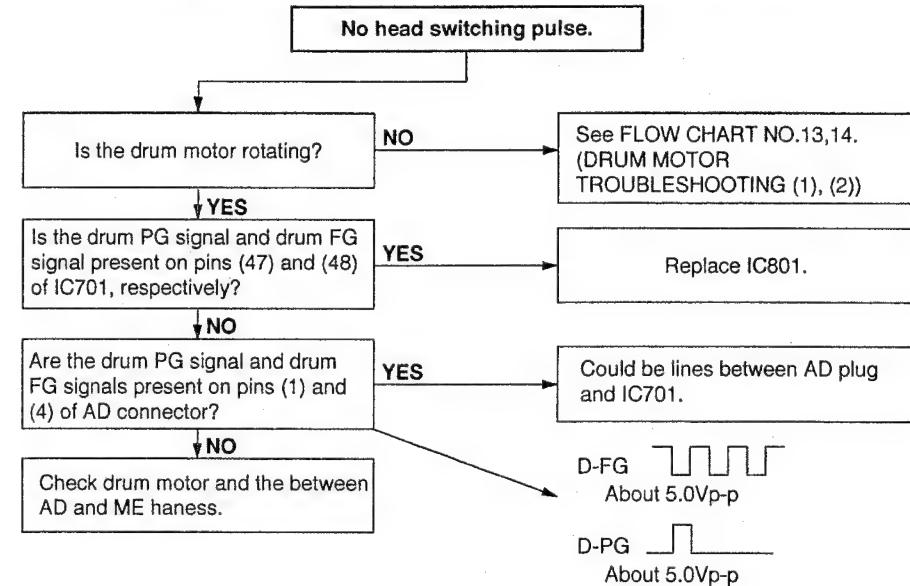
FLOW CHART NO.13 DRUM MOTOR TROUBLESHOOTING (1)



FLOW CHART NO.14 DRUM MOTOR TROUBLESHOOTING (2)

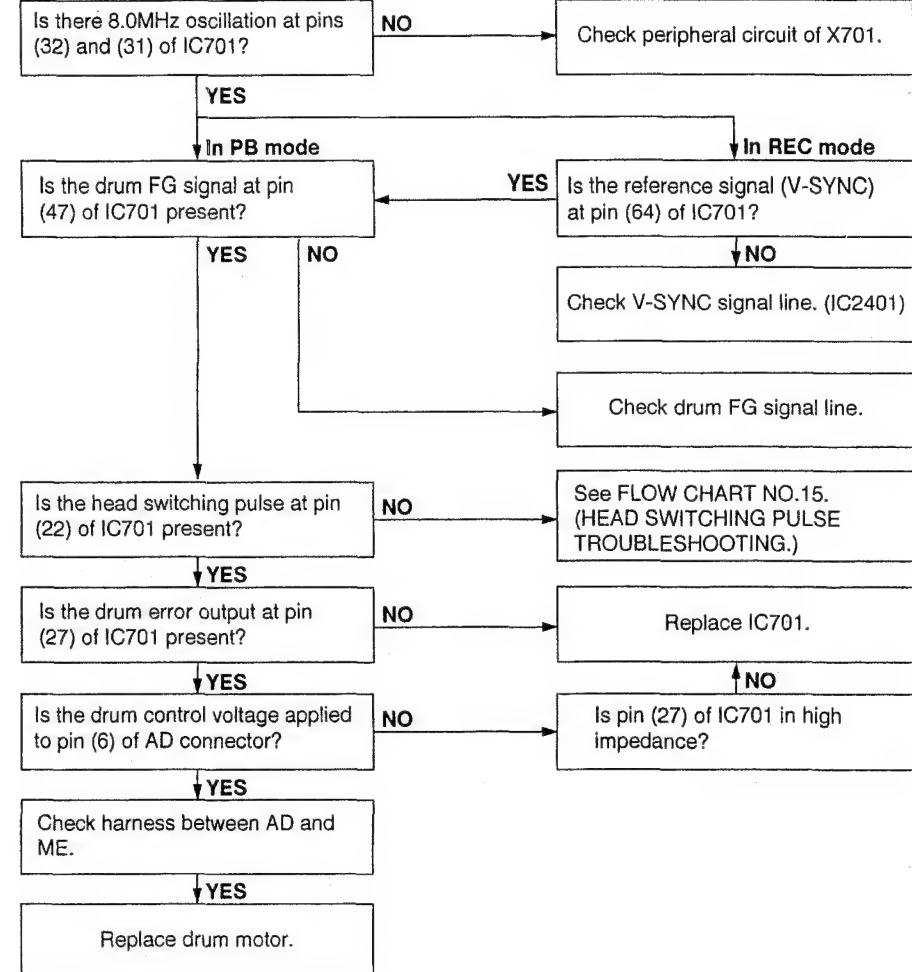


FLOW CHART NO.15 HEAD SWITCHING PULSE TROUBLESHOOTING.

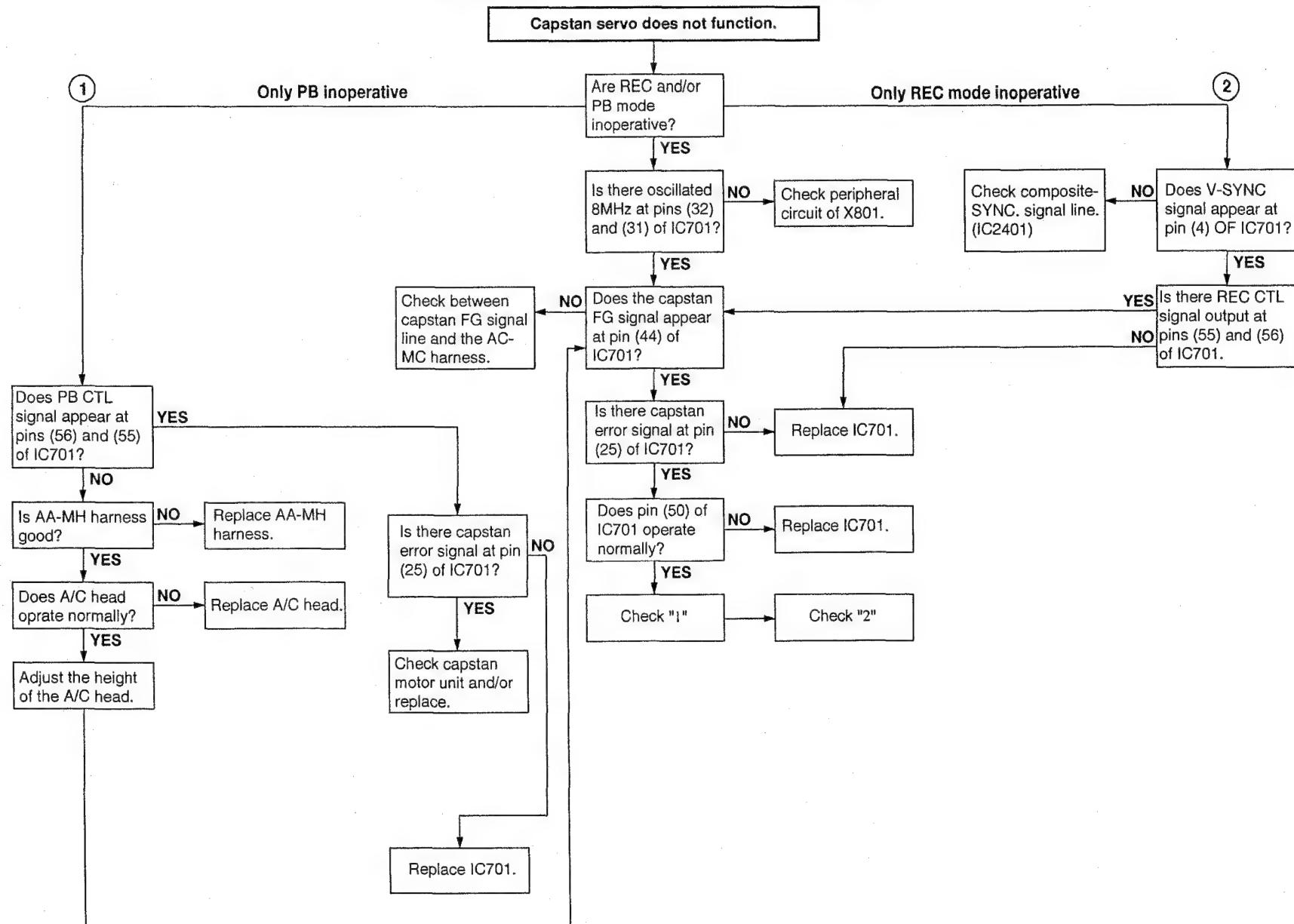


FLOW CHART NO.16 DRUM SERVO TROUBLESHOOTING

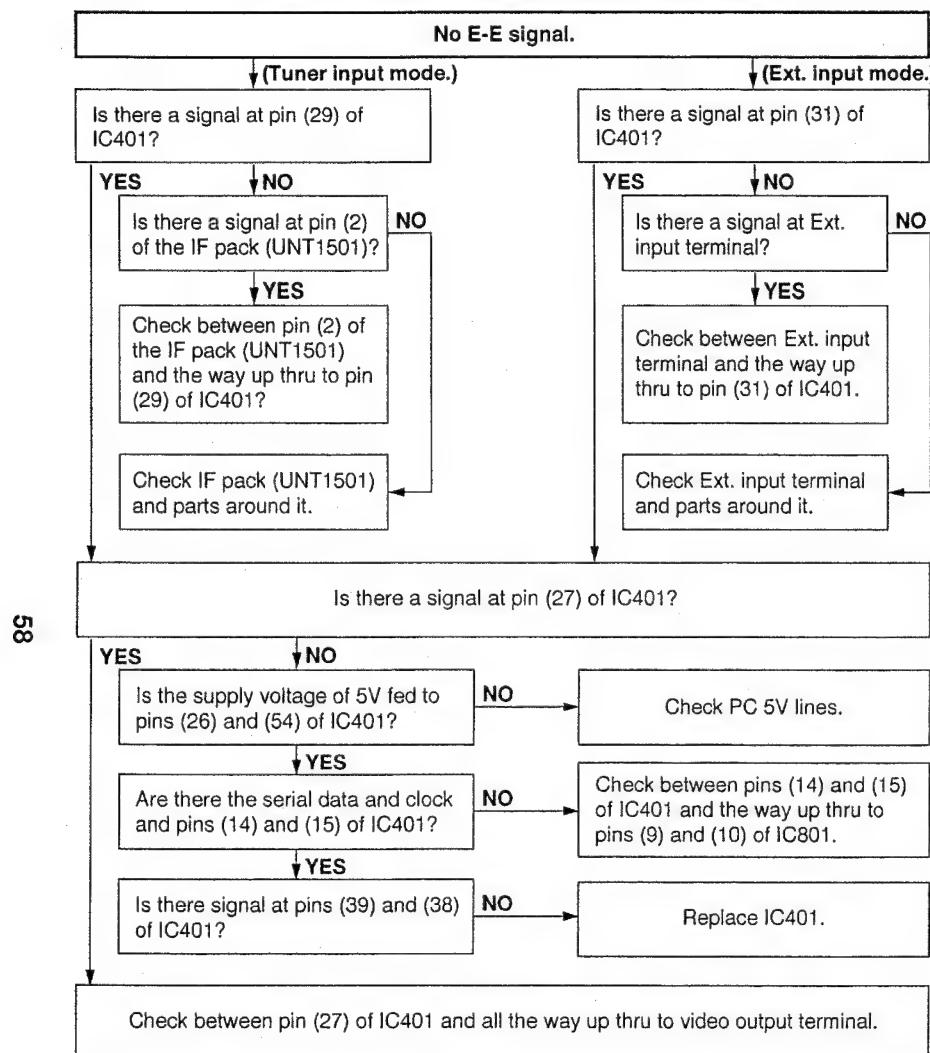
Drum servo does not function.



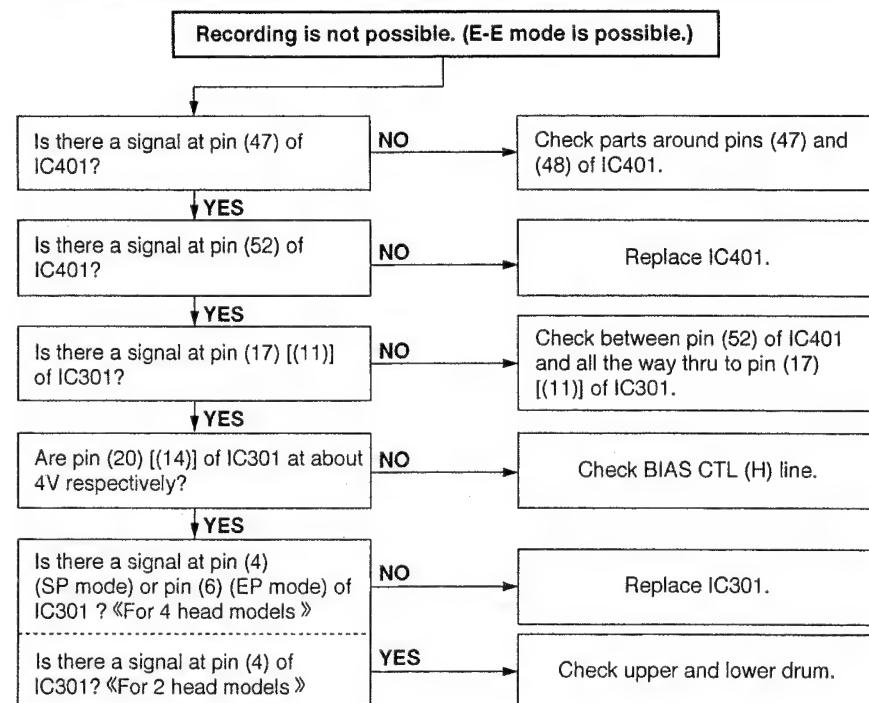
FLOW CHART NO.17 CAPSTAN SERVO TROUBLESHOOTING



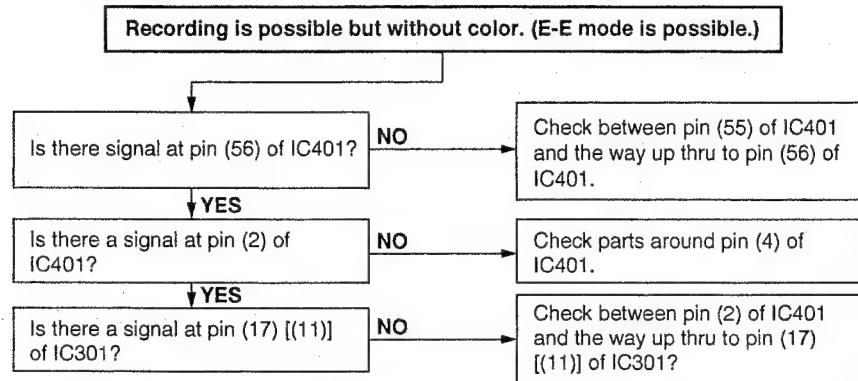
FLOW CHART NO.18 E-E MODE TROUBLESHOOTING



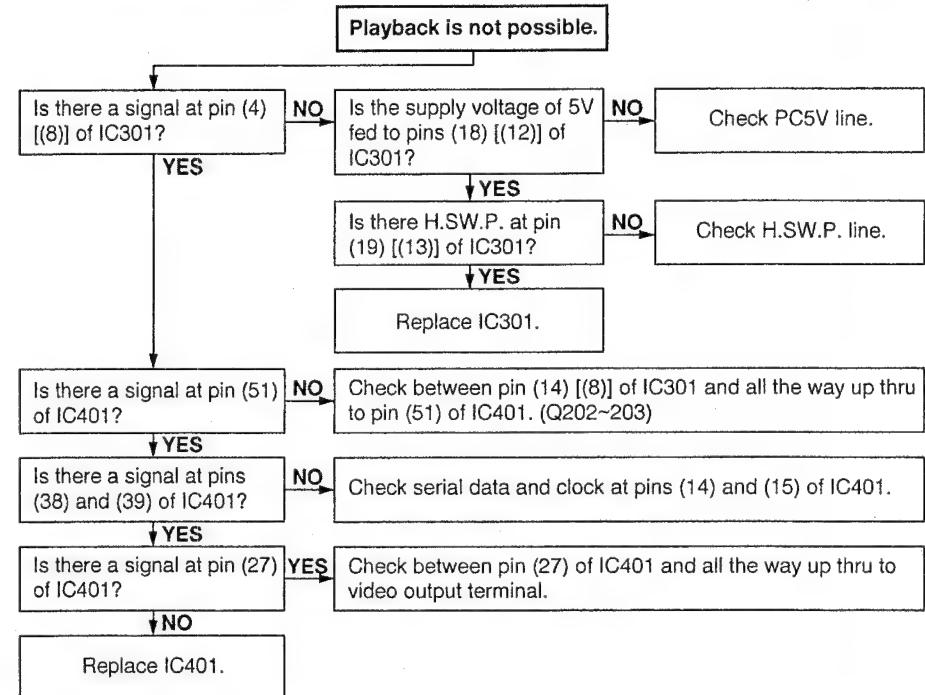
FLOW CHART NO.19 RECORDING MODE (LUMINANCE) TROUBLESHOOTING



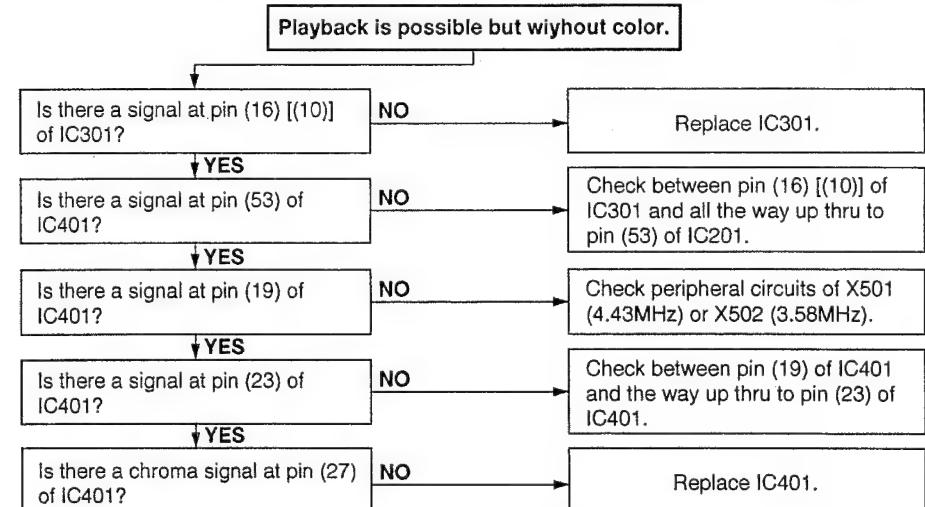
FLOW CHART NO.20 RECORDING MODE (CHROMA) TROUBLESHOOTING



FLOW CHART NO.21 PLAYBACK MODE (LUMINANCE) TROUBLESHOOTING

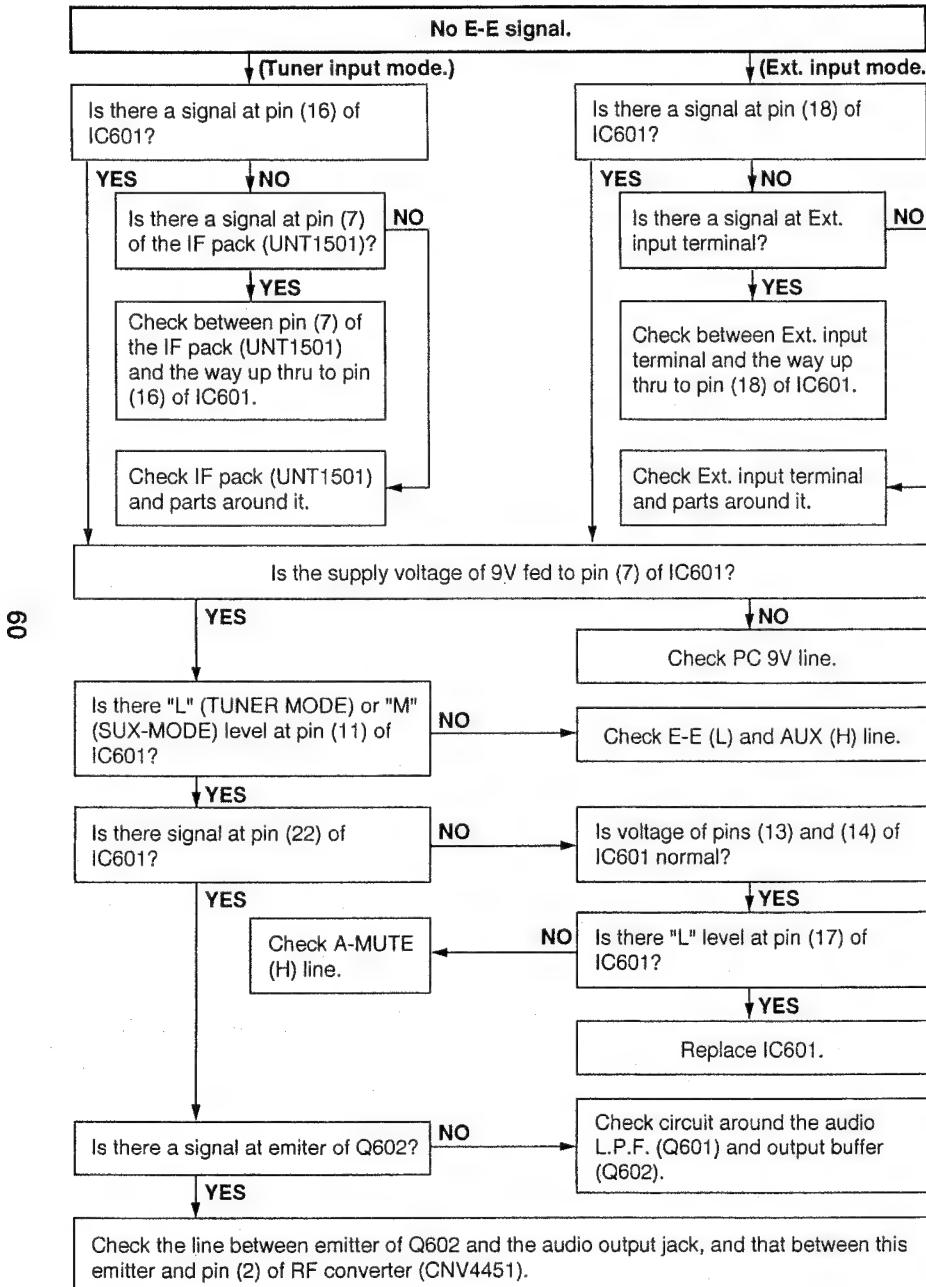


FLOW CHART NO.22 PLAYBACK MODE (CHROMA) TROUBLESHOOTING

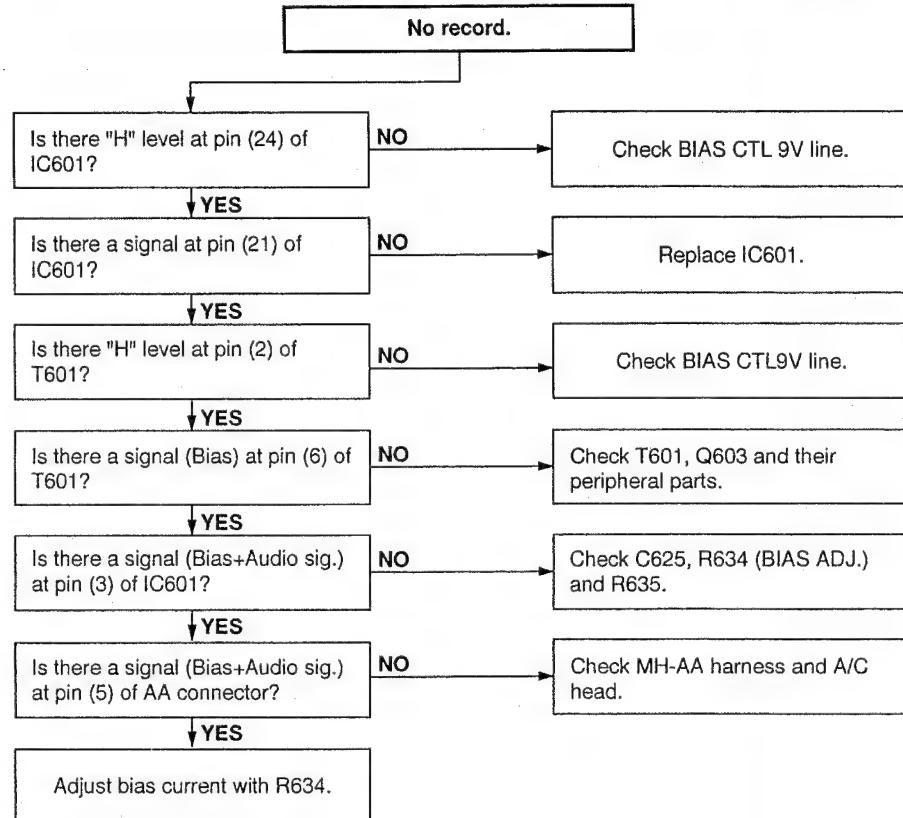


Note: Words shown in the bracket "[]" are for the 2 head models only.

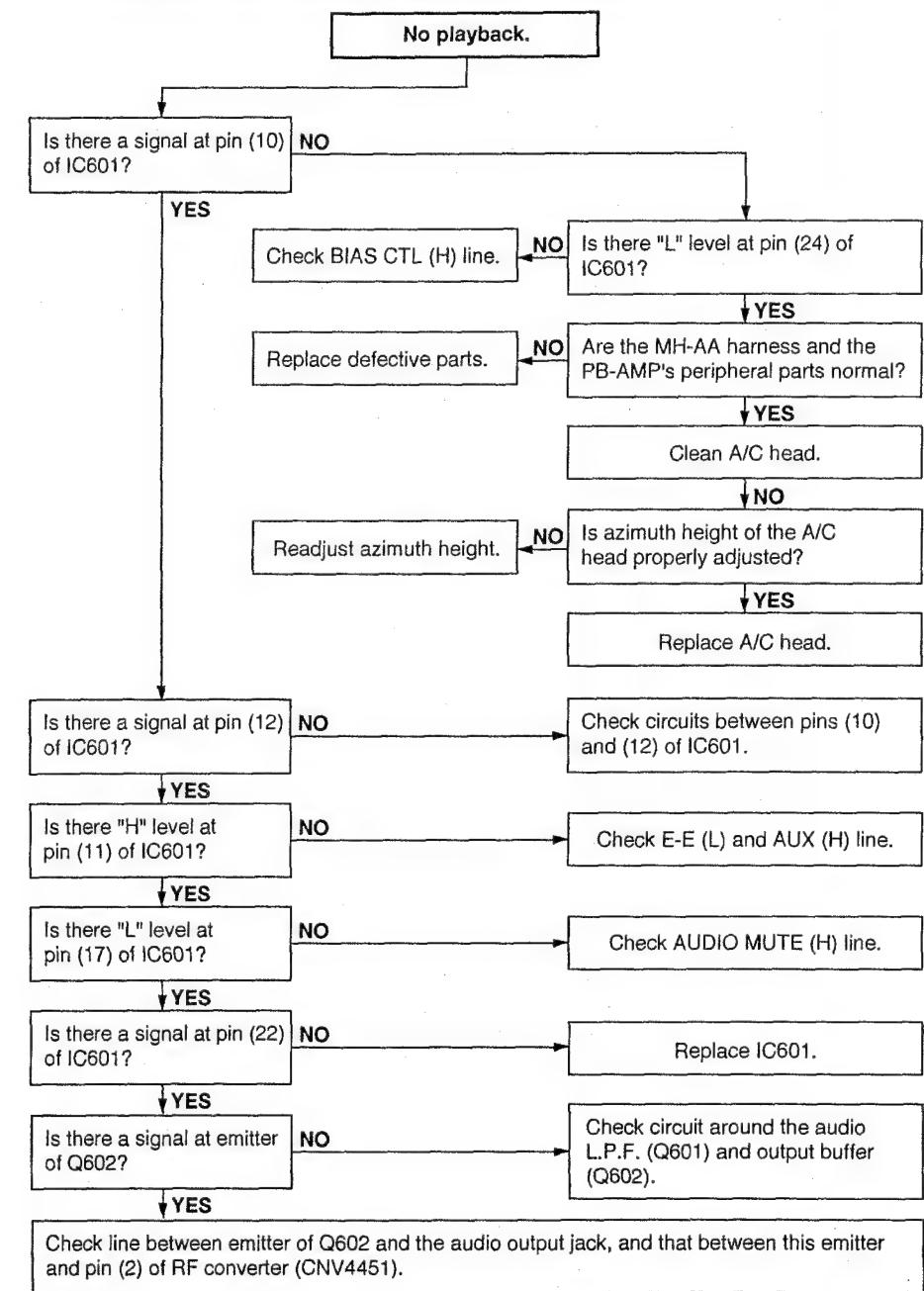
FLOW CHART NO.23 LINEAR SOUND E-E MODE TROUBLESHOOTING



FLOW CHART NO.24 LINEAR SOUND RECORDING MODE TROUBLESHOOTING



FLOW CHART NO.25 LINEAR SOUND PLAYBACK MODE TROUBLESHOOTING



REPLACEMENT OF IC703 (E²PROM)

«Servicing precautions»

When the IC703 (E²PROM) has been replaced, make the following reprogramming.

Depending on models, the IC703 (E²PROM) has been factory adjusted for its memory function.

It's therefore necessary to reprogram the memory function for the model in question.

Note that the servo circuit requires readjustments for the head switching point, slow and still modes. The channels will require returning.

Memory function reprogramming.

1. Check the power off. (power is standby mode)

2. Press the TEST switch S5005.

Be sure that all the fluorescent display tubes light up into the TEST mode.

3. Using the CHANNEL (+) and (-) buttons, select the right function numbers from among JP0-JP31, which appear in the fluorescent display tube, referring to the E²PROM map.

Press the OSD button to pick up the functions (ON) and the CLEAR button to discard the functions (OFF).

OSD and CLEAR buttons, are located on the remote control unit.

* When the OSD button has been pressed (ON), the memory function No. starts flashing.

* When the CLEAR button has been pressed (OFF), the memory function No. lights up.

4. Press the INT switch S5004.

5. Example: "ON" and "OFF" are taken as "1" and "0" respectively.

The numbers JP0 to JP31 are divided into four groups and each group's setting is displayed in hexadecimal notation.

J31	J30	J29	J28	J27	J26	J25	J24	J23	J22	J21	J20	J19	J18	J17	J16
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		↓			↓				↓				↓		
		SPACE			0				0				0		
J15	J14	J13	J12	J11	J10	J09	J08	J07	J06	J05	J04	J03	J02	J01	J00
0	0	0	0	0	1	0	0	0	0	0	0	1	1	0	1
														↓	
						↓				↓				D	
						0				0					

"000040D" appears in the fluorescent display tube.

6. Finally press the TEST key S5005.

NOTE: The remote control from VCR 3706 series must be used to reprogram the E²PROM, due to the CLEAR button not being present on another remote control.

(OSD = )

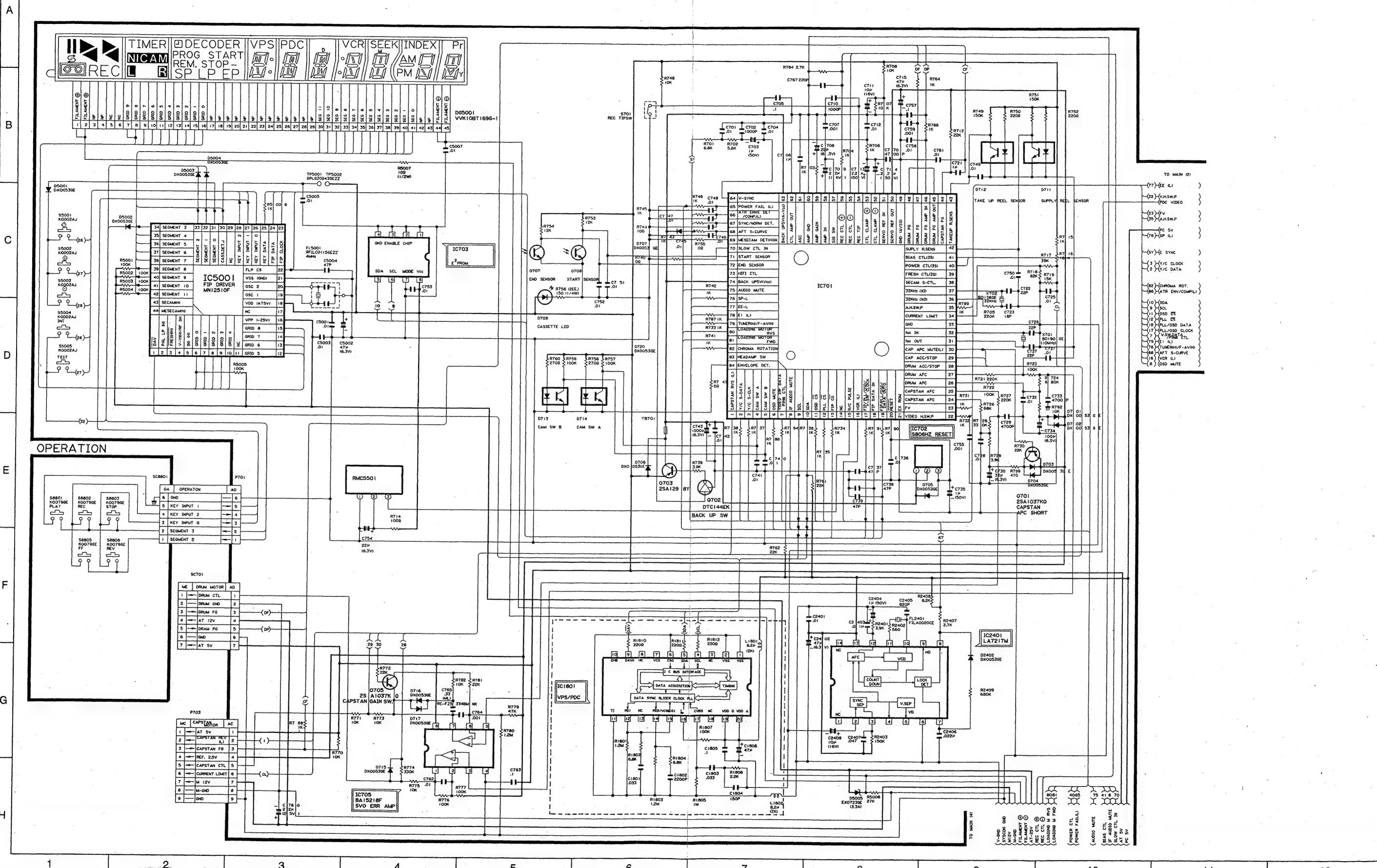
ROM MAP

	3706NE	3706CE	3706SE	3716NE	3716CE	3716I	3716EP	3716UK	4706NE	7156NE
JP31 —	0	0	0	0	0	0	0	0	0	0
30 —	0	0	0	0	0	0	0	0	0	0
29 —	0	0	0	0	0	0	0	0	0	0
28 —	0	0	0	0	0	0	0	0	0	0
27 VS ENVE	0	0	0	0	0	0	0	0	0	0
26 —	0	0	0	0	0	0	0	0	0	0
25 HEAD 1	0	0	0	0	0	0	0	0	0	0
24 HEAD 0	0	0	0	0	0	0	0	1	0	0
23 Hi-Fi	0	0	0	0	0	0	0	0	0	0
22 AUTO CLOCK	0	0	0	1	1	1	1	1	0	0
AUTO SORTING	0	0	0	1	1	1	1	1	0	0
21 DECODER	0	0	0	0	0	0	1	0	0	0
20 SHUTTLE	0	0	0	0	0	0	0	0	0	0
19 NICAM 1	0	0	0	0	0	0	0	0	0	0
18 NICAM 0	0	0	0	0	0	0	0	0	0	0
17 G-CODE 1	0	0	0	0	0	0	0	0	0	0
16 G-CODE 0	0	0	0	1	1	1	1	1	0	0
15 OEM	0	0	0	0	0	0	0	0	1	1
14 LP	0	0	0	0	0	0	0	1	0	0
13 FRONT-AV	0	0	0	0	0	0	0	0	0	0
12 DUAL SCART	0	0	0	0	0	0	1	0	0	0
11 CATV/PIF	1	1	1	1	1	1	1	0	1	1
10 TUNER 2	0	0	0	0	0	0	0	0	0	0
9 TUNER 1	0	0	0	0	0	0	0	1	0	0
8 TUNER 0	0	0	0	0	0	0	0	1	0	0
7 REMAIN	1	1	1	1	1	1	1	1	1	1
6 DK/BG	0	0	0	0	0	0	0	0	0	0
5 VCR 1	1	1	1	1	1	1	1	1	1	1
4 VCR 0	0	0	0	0	0	0	0	0	0	0
3 PDC	0	1	0	1	1	0	0	1	1	1
2 VPS	0	1	0	1	1	0	0	1	1	1
1 COLOR 1	0	0	0	0	0	0	0	0	0	0
0 COLOR 0	0	0	0	0	0	0	0	0	0	0
DISPLAY	8A0	8AC	8A0	4108AC	4108AC	4108A0	6118A0	14143AC	88AC	88AC

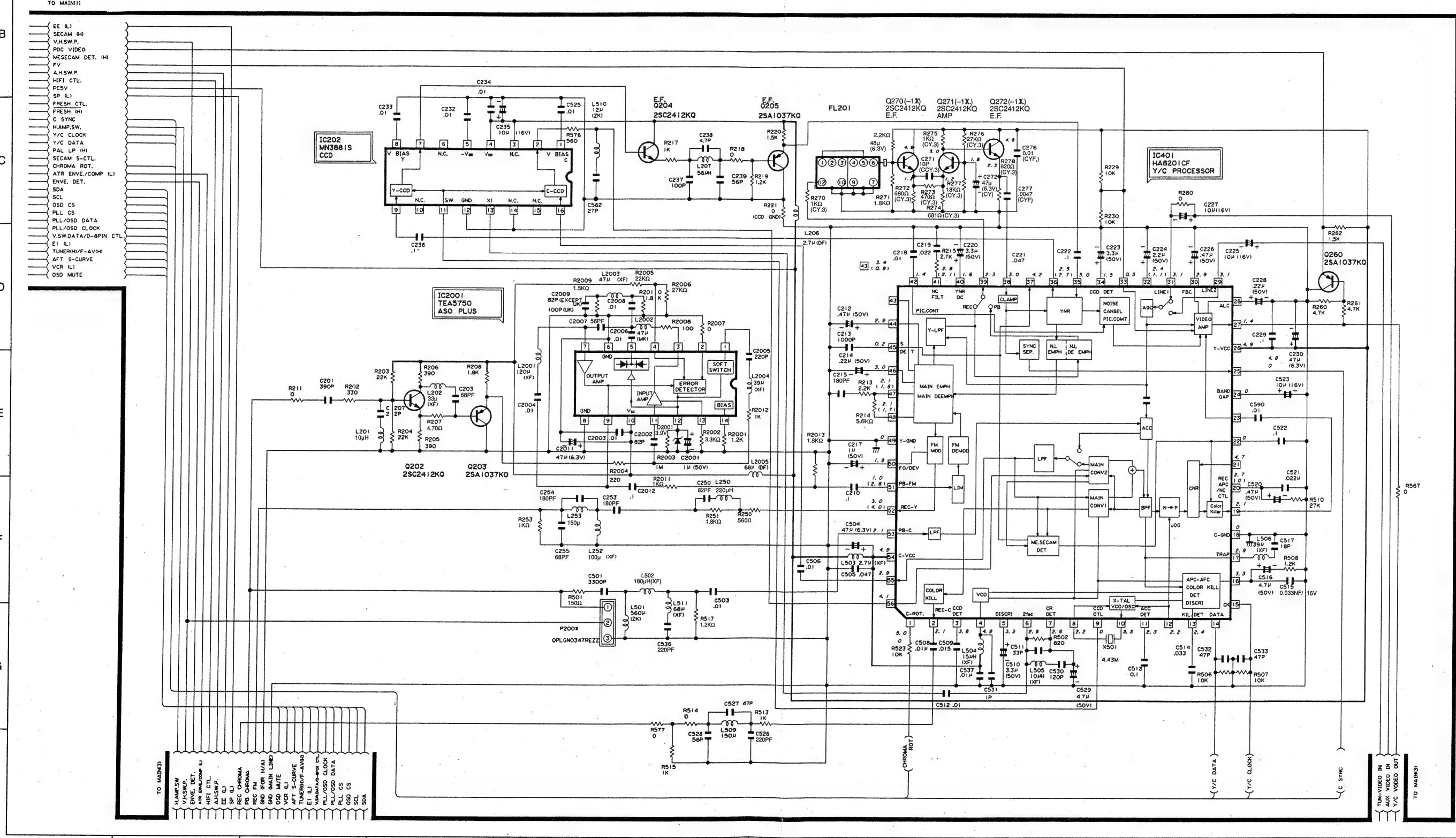
(Note: "1" : flashing "0" : lights up)

NOTES:

MAIN(1) CIRCUIT (VCR3706NE/CE/SE/4706NE/7156NE/3716NE/CE/I/EP/UK)



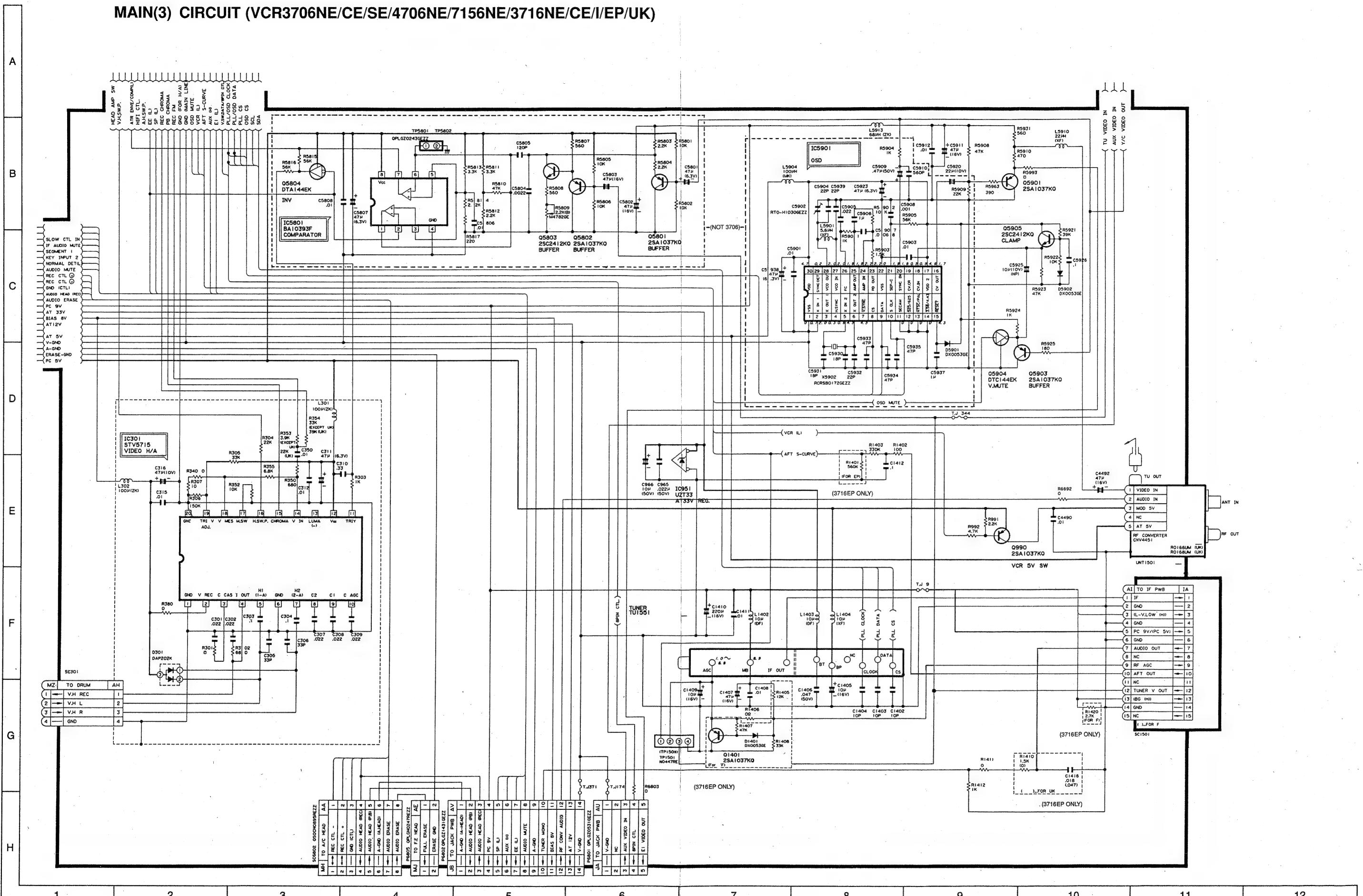
MAIN(2) CIRCUIT (VCR3706NE/CE/SE/4706NE/7156NE/3716NE/CE/I/EP/UK)



* VOLTAGE MEASUREMENT MODE

PB..... Parentheses ()
REC Without Parentheses

MAIN(3) CIRCUIT (VCR3706NE/CE/SE/4706NE/7156NE/3716NE/CE/I/EP/UK)



* VOLTAGE MEASUREMENT MODE

PB..... Parentheses ()
REC..... Without Parentheses

MAIN(4) CIRCUIT (VCR3706NE/CE/SE/4706NE/7156NE/3716NE/CE/I/EP/UK)

A

B

C

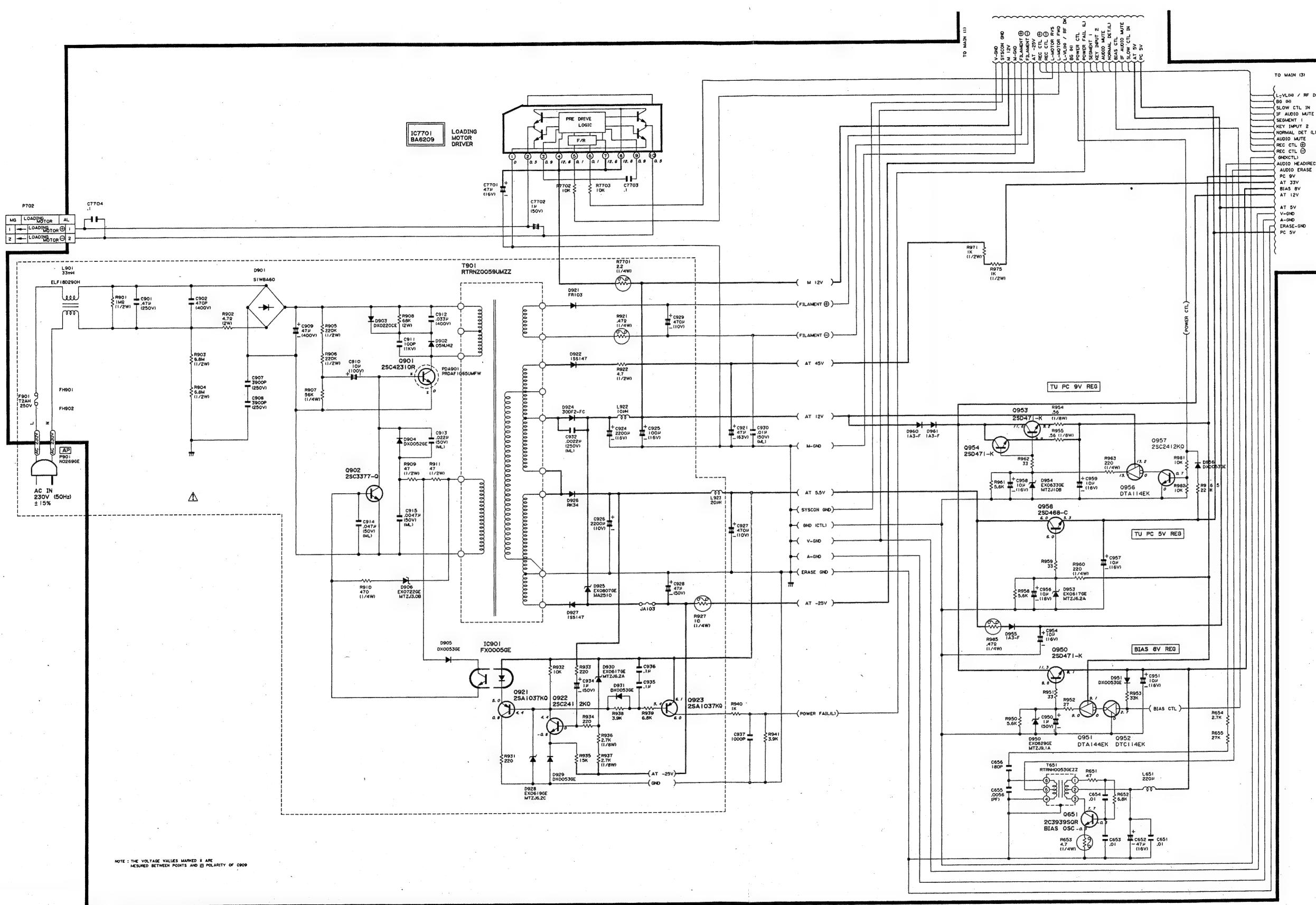
D

E

F

G

H



* VOLTAGE MEASUREMENT MODE

 PB Parentheses ()

 REC Without Parentheses

TERMINAL CIRCUIT (VCR3706NE/CE/SE/4706NE/7156NE/3716NE/CE/I/EP/UK)

A

B

C

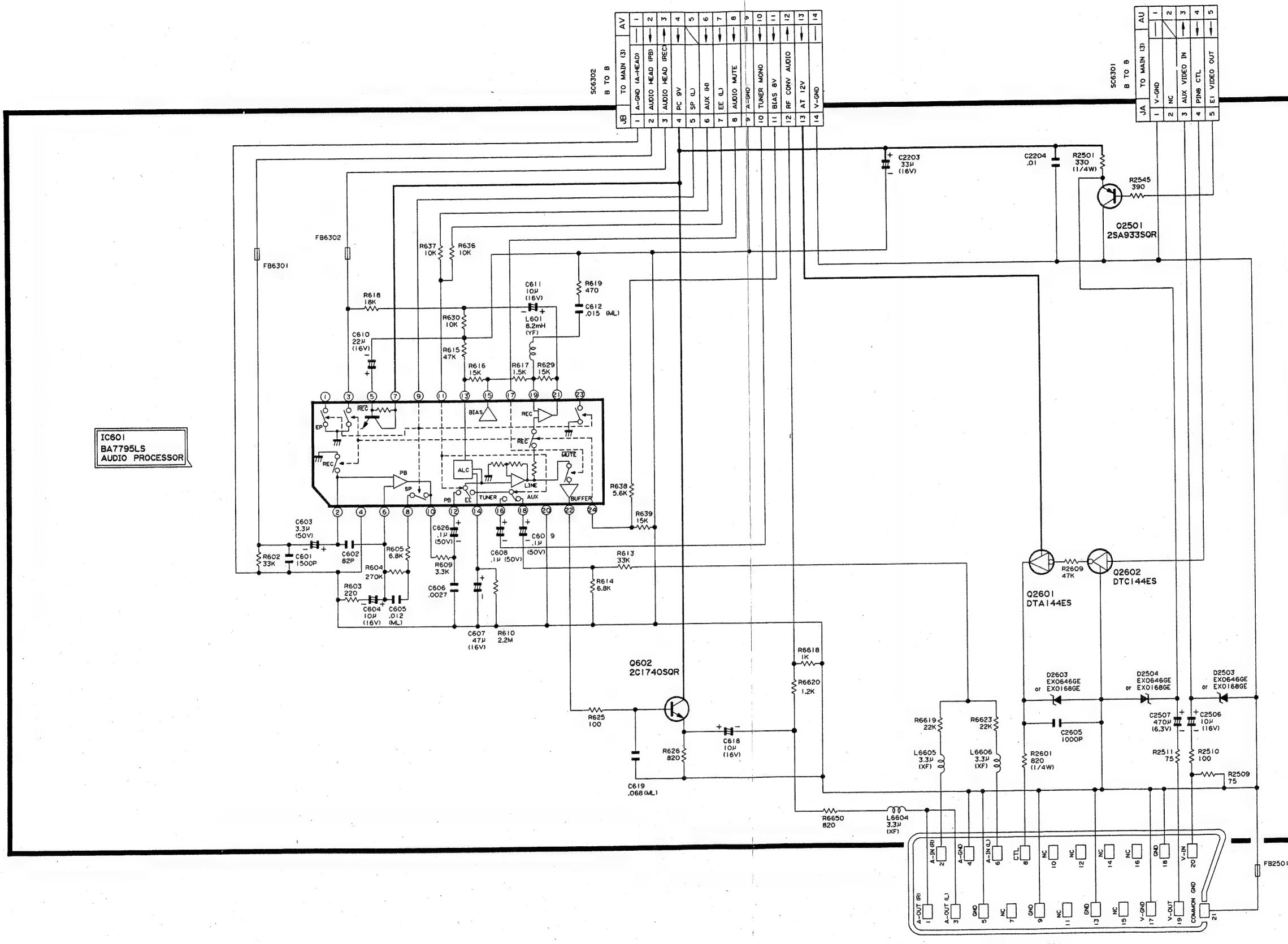
D

E

8

G

T



ANGLE MEASUREMENT MODE

PB..... Parentheses ()

REC Without Parentheses



NOTES:

10. REPLACEMENT PARTS LIST

PARTS REPLACEMENT

Many electrical and mechanical parts in video cassette recorder have special safety-related characteristics. These characteristics are often not evident from visual inspection nor can the protection afforded by them necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in this manual; electrical components having such features are identified by  and shaded areas in the Replacement Parts Lists and Schematic Diagrams. The use of a substitute replacement part which does not have the same safety characteristics as the factory recommended replacement parts shown in this service manual may create shock, fire or other hazards.

"HOW TO ORDER REPLACEMENT PARTS"

To have your order filled promptly and correctly, please furnish the following informations.

1. MODEL NUMBER	2. REF. NO.
3. PART NO.	4. DESCRIPTION

HOW TO IDENTIFY CHIP TRANSISTORS AND DIODES BY ITS MARKING

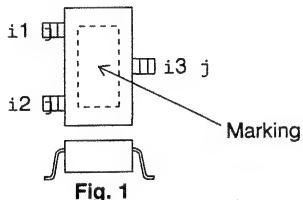


Fig. 1

Package	Marking	Parts No.
Fig. 1	25	
Fig. 1	24	
Fig. 1	26	
Fig. 1	16	
Fig. 1	BQ	
Fig. 1	FQ	

MARK ♠: SPARE PARTS-DELIVERY SECTION.

Ref. No.	Part No.	Description
PRINTED WIRING BOARD ASSEMBLIES (NOT REPLACEMENT ITEM)		

- Main Unit
- Main Unit
- Main Unit
- Main Unit
- Operation Unit

Ref. No.	Part No.	Description
MAIN UNIT ASSEMBLY		
TUNER AND ASSEMBLY		
CNV4451 58260563 RF Converter 58260564 (UK only) TU1551 58230625 VHF Tuner 58230624 (UK only) UNT1501 58260565 IF-PACK Unit 58260566 (UK only)		
INTEGRATED CIRCUITS		
IC202 37717029 IC MN3881S1E IC301 37717038 IC STV5715 IC401 37717028 IC HA8201CF1 IC601 37717003 IC BA 7795LS IC701 37717032 Syscon/Servo/Timer (VCR3716CE/I) IC701 37717033 Syscon/Servo/Timer (VCR3716UK) IC701 37717034 Syscon/Servo/Timer (VCR3706NE/CE/SE 4706NE/7156NE) IC701 37717035 Syscon/Servo/Timer (VCR3716NE) IC701 37717036 Syscon/Servo/Timer (VCR3716EP) IC702 37717007 IC S 806HZ IC703 37717040 EPROM (VCR3716NE/CE/EP/I/UK) IC703 37717039 EPROM (VCR3706NE/CE/SE/ 4706NE/7156NE) IC705 37717005 IC BA 15128F IC951 37717011 IC UZT33 IC1801 37717037 IC SDA5649X (VCR3706NE/CE/SE/3716CE/ UK) IC2001 37717030 IC TEA5750 IC2401 37716993 IC LA7217M IC2501 37716997 IC BA 7630F (VCR3716EP) IC5001 37716998 IC MN 12510F IC5801 37716183 IC BA 10393F (VCR3706NE/CE/SE/3716NE/ CE/I/UK/4706NE/7156NE) IC5901 37717031 OSD (VCR3716NE/CE/I/EP/UK) IC6681 37717004 IC BA 7631F (VCR3716EP) IC7701 37715089 IC BA 6209		
TRANSISTORS		
Q202 36145507 2SC2412KQ Q203 36147830 2SA1037KQ Q204 36145507 2SC2412KQ Q205 36147830 2SA1037KQ		

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description		
TRANSISTORS (Continued)					DIODES (Continued)		
Q260	36147830	2SA1037KQ	D704	36562889	1SS132		
Q602	36147609	2SC1740S (VCR3706NE/CE/SE/3716NE/ CE/I/UK/4706NE/7156NE)	D705	36562889	1SS132		
Q651	36147836	2SC3939SQR	D706	36562889	1SS132		
Q701	36147830	2SA1037KQ	D707	36562889	1SS132		
Q702	36144469	DTC144EK	D708	36563773	Photodiode		
Q703	36147831	2SA1298Y	D711	36563780	Reel Sensor		
Q705	36147830	2SA1037KQ	D712	36563780	Reel Sensor		
△ Q901	36147838	2SC4231Q	D713	36563779	Mecha-posi Sensor		
△ Q902	36147832	2SC3377Q	D714	36563779	Mecha-posi Sensor		
Q921	36147830	2SA1037KQ	D715	36562889	1SS132		
Q922	36145507	2SC2412KQ	D716	36562889	1SS132		
Q923	36147830	2SA1037KQ	D717	36562889	1SS132		
Q950	36147835	2SD471KL	D720	36562889	1SS132		
Q951	36144628	DTA144EK	△ D901	36563781	Diode Bridge		
Q952	36144480	DTC114EK	D902	36563801	Diode		
Q953	36147835	2SD471KL	△ D903	36563782	Diode		
Q954	36147835	2SD471KL	D904	36563783	Diode		
Q956	36144302	DTA114EK	D905	36562889	1SS132		
Q957	36145507	2SC2412KQ	D906	36563802	Zener Diode MTZJ3,0B		
Q958	36144098	2S0468C	D921	36563771	FR103		
Q990	36147830	2SA1037KQ	D922	36563798	1SS147		
Q2501	36147833	2SA933S (VCR3706NE/CE/SE/3716NE/ CE/I/UK/4706NE/7156NE)	D924	36563772	30DF2-FC		
Q2601	36145252	DTA144ES (VCR3706NE/CE/SE/3716NE/ CE/I/UK/4706NE/7156NE)	D925	36563785	Zener Diode		
Q2602	36145227	DTC144ES (VCR3706NE/CE/SE/3716NE/ CE/I/UK/4706NE/7156NE)	D926	36563789	RK34		
Q5801	36147830	2SA1037KQ	D927	36563798	1SS147		
Q5802	36147830	2SA1037KQ	D928	36563803	Zener Diode 6.2V 83		
Q5803	36145507	2SC2412KQ	D929	36562889	1SS132		
Q5804	36144628	DTA144EK	D930	36563799	Zener Diode MTZJ6,2A		
Q5901	36147830	2SA1037KQ	D931	36562889	1SS132		
Q5903	36147830	2SA1037KQ (VCR3716NE/CE/I/UK)	D950	36563804	Zener Diode MTZJ10B		
Q5904	36144469	DTC144EK (VCR3706SE/3716NE/CE)	D951	36562889	1SS132		
Q5905	36145507	2SC2412KQ (VCR3716NE/CE/UK)	D953	36563799	Zener Diode MTZJ6,2A		
Q6602	36144628	DTA144EK (VCR3716EP)	D954	36563805	Zener Diode		
Q6604	36147834	2SD1306 (VCR3716EP)	D955	36563774	1A3-F		
Q6605	36144469	DTC144EK (VCR3716EP)	D956	36562889	1SS132		
DIODES					D960	36563774	1A3-F
D301	36562981	DAP202K	D961	36562889	1A3-F		
D540	36562889	1SS132	D2402	36562889	1SS132		
D701	36562889	1SS132	D2501	36563796	Zener Diode 15V B1 (VCR3716EP)		
D702	36562889	1SS132	D2502	36563796	Zener Diode 15V B1 (VCR3716EP)		
D703	36562889	1SS132	D2503	36563796	Zener Diode 15V B1		
			D2504	36563796	Zener Diode 15V B1		
			D2603	36563796	Zener Diode 15V B1		
			D5001	36562889	1SS132		
			D5002	36562889	1SS132		
			D5003	36562889	1SS132		
			D5004	36562889	1SS132		
			D5005	36563797	Zener Diode MTZJ6,2A		
			D5901	36562889	1SS132		
					(VCR3716NE/CE/I/EPUK)		
			D5902	36562889	1SS132		
					(VCR3716NE/CE/I/EPUK)		
			D6801	36562889	1SS132		
					(VCR3716EP)		

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description	
DIODES (Continued)					COILS AND TRANSFORMERS (Continued)	
D6802	36562889	1SS132 (VCR3716EP)	L1404	45434148	Coil 10µH (VCR3716NE/CE/I/ 4706NE/7156NE)	
△ IC901	37717010	Photo Coupler FX 0005	L1801	45434179	Coil 8.2µH (VCR3706NE/CE/SE 3716NE/CE/UK)	
Q707	36563775	Photodiode	L1802	45434179	Coil 8.2µH (VCR3706NE/CE/SE 3716NE/CE/UK)	
Q708	36563775	Photodiode	L2001	45434195	Coil 120µH	
PACKAGED CIRCUITS					Coil 47µH	
X501	44212280	Crystal 4.43 MHZ	L2002	45434173	Coil 47µH	
X701	44212282	Crystal 10 MHZ	L2003	45434185	Coil 47µH	
X702	44212283	Crystal 32.678 KHZ	L2004	45434193	Coil 39µH	
X5902	44212286	Crystal	L2005	45434196	Coil 68µH	
COILS AND TRANSFORMERS					Coil 5.6µH (VCR3716NE/CE/ I/EP/UK)	
FL2401	45526894	Filter LA 0020	L5901	45434178	Coil 100µH	
FL5001	45526895	Filter	L5904	45434152	Coil 22µH (VCR3716NE/CE/I/ EP/UK)	
L201	45434184	Coil 100µH	L5910	45434177	Coil 68µH	
L202	45434185	Coil 47µH	L5913	45434176	Coil 3.3µH	
L203	45434172	Coil 10µH (VCR3716NE/CE/I/EP/UK/ 4706NE/7156NE)	L6604	45434137	Coil 3.3µH	
L205	45434180	Inductor 68µH	L6605	45434137	Coil 3.3µH	
L206	45434186	Coil 2.7µH (VCR3706SE/3716NE/CE/I/ EP/UK/4706NE/7156NE)	L6606	45434137	Coil 3.3µH	
L207	45434187	Inductor 56µH	L6610	45434137	Coil 3.3µH (VCR3716EP)	
L250	45434188	Coil 6.8µH	T651	45113544	OSC. Transformer	
L251	45434189	Coil 22µH	△ T901	45113548	Power Transformer	
L252	45434190	Inductor 82µH	C201		390p 50V S Chip	
L253	45434191	Inductor 68µH	C202		680p 50V S Chip	
L301	45434152	Coil 100µH	C203		22p 50V S Chip (VCR3706SE/3716NE/CE/I/ EP/UK/4706NE/7156NE)	
L302	45434152	Coil 100µH	C203		27p 50V S Chip (VCR3706NE/CE)	
L501	45434175	Coil 560µH	C210		0.1 25V S Chip	
L503	45434183	Coil 2.7µH (VCR4706NE/7156NE)	C211		10p 50V S Chip	
L504	45434147	Coil 15µH	C212		0.47 50V Electrolytic	
L505	45434192	Inductor 10µH	C213		0.001 S Chip	
L506	45434193	Coil 39µH	C214		0.22 50V Electrolytic	
L509	45434194	Inductor 150µH	C215		100p 50V S Chip	
L510	45434174	Coil 12µH	C216		10p 50V S Chip	
L511	45434151	Coil 68µH	C217		1.0 50V Electrolytic	
L601	45434156	Coil 8200µH	C218		0.01 50V S Chip	
L651	45434154	Coil 220µH	C219		0.022 S Chip	
△ L901	45526702	Filter LF0227 (VCR4706NE/7156NE)	C220		3.3 50V Electrolytic	
L922	45434158	Coil 10µH	C221		0.047 50V S Chip	
L923	45434171	Coil 22µH	C222		0.1 25V S Chip	
L1402	45434172	Coil 10µH	C223		3.3 50V Electrolytic	
L1403	45434172	Coil 10µH (VCR3706NE/CE/3716NE/ CE/I/UK4706NE/7156NE)	C224		2.2 50V Electrolytic	
L1403	45434148	Coil 10µH (VCR3706SE/3716EP)	C225		10 16V Electrolytic	
L1404	45434172	Coil 10µH (VCR3706NE/CE/SE/3716EP)	C226		0.47 50V Electrolytic	
			C227		10 16V Electrolytic (VCR3716EP)	

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
CAPACITORS (Continued)			CAPACITORS (Continued)		
C228	0.22	50V Electrolytic	C508	0.1	50V Ceramic
C229	0.1	50V Ceramic			(VCR3706NE/CE)
C230	47	6.3V Electrolytic	C509	0.015	S Chip
C232	0.1	Ceramic	C510	3.3	50V Electrolytic
		(VCR3706SE/3716NE/CE/I/ EP/UK/4706NE/7156NE)	C511	33p	50V S Chip
C232	0.1	50V Ceramic	C512	0.1	Ceramic
		(VCR3706NE/CE)			(VCR3706SE/3716NE/CE/I/ EP/UK/4706NE/7156NE)
C233	0.1	Ceramic	C512	0.1	50V Ceramic
		(VCR3706SE/3716NE/CE/I/ EP/UK/4706NE/7156NE)			(VCR3706NE/CE)
C233	0.1	50V Ceramic	C513	0.1	16V S Chip
		(VCR3706NE/CE)	C514	0.033	16V S Chip
C234	0.1	Ceramic			(VCR3706SE/3716NE/CE/I/ EP/UK/4706NE/7156NE)
C235	10	16V Electrolytic	C515	0.1	16V S Chip
C236	0.1	50V Ceramic	C516	4.7	50V Electrolytic
C237	100p	50V S Chip	C517	18p	S Chip
C238	4.7p	S Chip	C520	0.47	50V Electrolytic
C239	56p	50V S Chip	C521	0.022	S Chip
C250	33p	50V S Chip	C523	10	16V Electrolytic
C253	82p	50V S Chip	C522	0.1	25V S Chip
C254	680p	50V S Chip	C525	0.01	50V S Chip
C255	68p	50V S Chip	C526	68p	50V S Chip
C301	0.022	S Chip	C527	47p	50V S Chip
C302	0.022	S Chip	C528	56p	50V S Chip
C303	0.22	16V S Chip	C529	4.7	50V Electrolytic
		(VCR3716EP)	C530	120p	50V S Chip
C303	0.1	25V S Chip	C531	1.0p	50V S Chip
		(VCR3706NE/CE/SE/3716NE/ CE/I/UK/4706NE/7156NE)	C532	47p	50V S Chip
C304	0.1	50V Ceramic	C533	47p	50V S Chip
		(VCR3716NE/CE/I/EP/UK)	C536	180p	50V S Chip
C305	33p	50V S Chip	C537	0.01	50V S Chip
C306	33p	50V S Chip	C562	27p	50V Ceramic
C307	0.022	S Chip	C590	0.1	Ceramic
C308	0.022	S Chip	C601	0.0015	Ceramic
C309	0.022	S Chip			(VCR3706NE/CE/SE/3716NE/ CE/I/UK/4706NE/7156NE)
C310	0.33	16V S Chip	C601	0.0015	Ceramic
C311	47	6.3V Electrolytic			(VCR3716EP)
C312	0.01	50V S Chip	C602	82p	50V Ceramic
C315	0.01	50V S Chip	C603	3.3	50V S Chip
C316	47	6.3V Electrolytic			(VCR3706NE/CE/SE/3716NE/ I/EP/UK)
C350	0.01	50V S Chip	C604	10	16V Electrolytic
C501	0.0033	S Chip			(VCR3706NE/CE/SE/3716NE/ I/EP/UK)
C503	0.01	50V S Chip	C604	10	16V Electrolytic
C504	47	6.3V Electrolytic			(VCR3706NE/CE/SE/3716NE/ I/EP/UK)
C505	0.047	50V S Chip	C605	0.012	Mylar
C506	0.1	Ceramic	C606	0.0027	Ceramic
		(VCR3706SE/3716NE/CE/I/ EP/UK/4706NE/7156NE)			(VCR3706NE/CE/SE/3716NE/ CE/I/UK/4706NE/7156NE)
C506	0.1	50V Ceramic	C606	0.0027	50V Ceramic
		(VCR3706NE/CE)			(VCR3716EP)
C508	0.1	Ceramic	C607	47	16V Electrolytic
		(VCR3706SE/3716NE/CE/I/ EP/UK/4706NE/7156NE)			

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
CAPACITORS (Continued)					CAPACITORS (Continued)
C608	0.1	50V Electrolytic (VCR3706NE/CE/SE/3716NE/ CE/I/UK/4706NE/7156NE)	C710	0.001	50V S Chip
C609	0.1	50V Electrolytic (VCR3706NE/CE/SE/3716NE/ CE/I/UK/4706NE/7156NE)	C711	10	16V Electrolytic
C610	22	16V Electrolytic	C712	0.01	50V S Chip
C611	10	16V Electrolytic (VCR3706NE/CE/SE/3716NE/ I/EP/UK)	C713	2.2	50V Electrolytic
C612	0.015	50V Mylar (VCR3706NE/CE/SE/3716NE/ CE/I/UK/4706NE/7156NE)	C714	2.2	50V Electrolytic
C613	0.022	Mylar (VCR3716UK)	C715	47	6.3V Electrolytic
C618	10	16V Electrolytic (VCR3706NE/CE/SE/3716NE/ I/EP/UK)	C721	1	10V S Chip
C619	0.0082	S Chip (VCR3716EP)	C722	22p	50V S Chip
C619	0.068	50V Mylar (VCR3706NE/CE/SE/3716NE/ CE/I/UK/4706NE/7156NE)	C723	18p	50V S Chip
C626	0.1	50V Electrolytic (VCR3706NE/CE/SE/3716NE/ CE/I/UK/4706NE/7156NE)	C725	0.01	50V S Chip
C626	0.1	25V Electrolytic (VCR3716EP)	C726	22p	50V S Chip
C651	0.1	Ceramic (VCR3706SE/3716NE/CE/I/ EP/UK/4706NE/7156NE)	C727	22p	50V S Chip
C651	0.1	50V Ceramic (VCR3706NE/CE)	C728	0.01	50V S Chip
C652	47	16V Electrolytic	C729	0.0047	S Chip
C653	0.1	Ceramic (VCR3706SE/3716NE/CE/I/ EP/UK/4706NE/7156NE)	C730	33	6.3V Electrolytic
C653	0.1	50V Ceramic (VCR3706NE/CE)	C731	0.01	50V S Chip
C653	0.1	Ceramic (VCR3706SE/3716NE/CE/I/ EP/UK/4706NE/7156NE)	C732	0.01	50V S Chip
C654	0.1	50V Ceramic (VCR3706SE/3716NE/CE/I/ EP/UK/4706NE/7156NE)	C733	0.0047	S Chip
C654	0.1	50V Ceramic (VCR3706NE/CE)	C734	100	6.3V Electrolytic
C655	0.0056	Mylar	C735	1.0	50V Electrolytic
C656	180p	50V S Chip	C736	0.1	Ceramic
C701	0.01	50V S Chip	C737	0.01	50V Ceramic
C702	0.001	50V S Chip	C738	47p	50V S Chip
C703	1.0	50V Electrolytic	C739	47p	50V S Chip
C704	0.01	50V S Chip	C740	47p	50V S Chip
C705	0.1	25V S Chip	C740	0.1	Ceramic
C706	1.0	10V S Chip	C741	0.1	50V Ceramic
C707	0.001	50V S Chip	C742	0.1	Ceramic
C708	22	6.3V Electrolytic	C742	0.1	50V Ceramic
C709	22	16V Electrolytic	C743	1000	6.3V Electrolytic
			C745	0.01	50V S Chip
			C746	0.01	50V S Chip
			C747	0.01	50V S Chip
			C748	0.01	50V S Chip
			C749	0.01	50V S Chip
			C750	0.01	50V S Chip
			C751	0.1	Ceramic
				(VCR3706SE/3716NE/CE/I/ EP/UK/4706NE/7156NE)	
			C751	0.1	50V Ceramic
				(VCR3706NE/CE)	

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
CAPACITORS (Continued)					CAPACITORS (Continued)
C752		0.01 Ceramic	C959		10 16V Electrolytic
C753		0.1 Ceramic (VCR3706SE/3716NE/CE/I/ EP/UK/4706NE/7156NE)	C965		0.022 S Chip
C753		0.01 50V Ceramic (VCR3706NE/CE)	C966		10 50V Electrolytic
C754		22 6.3V Electrolytic	C1402		10p 50V S Chip
C755		0.001 50V S Chip	C1403		10p 50V S Chip
C756		0.1 50V Ceramic (VCR3716EP)	C1404		10p 50V S Chip
C757		0.1 25V S Chip	C1405		10 16V Electrolytic
C758		0.01 50V S Chip	C1406		0.047 Ceramic
C759		0.001 50V S Chip	C1407		(VCR3706SE/3716NE/CE/I/ EP/UK/4706NE/7156NE)
C760		22 25V Electrolytic	C1408		0.01 50V Ceramic (VCR3706NE/CE)
C761		0.01 50V S Chip	C1409		47 16V Electrolytic
C762		0.01 25V S Chip	C1410		0.01 50V S Chip
C763		0.1 25V S Chip	C1411		10 16V Electrolytic
C764		0.001 50V S Chip	C1411		220 16V Electrolytic
C765		0.33 Mylar	C1411		0.1 Ceramic
C767		220p 50V S Chip	C1411		(VCR3706SE/3716NE/CE/I/ EP/UK/4706NE/7156NE)
C770		0.0047 S Chip	C1412		0.01 50V Ceramic
C813		22p 50V S Chip	C1412		(VCR3706NE/CE)
△ C901	32619089	Metalised Capacitor (VCR3716CE/4706NE/ 7156NE)	C1416		0.1 25V S Chip
C902	32619086	Ceramic	C1552		0.018 50V Mylar
△ C907	32619085	Ceramic			(VCR3706NE/CE/SE/3716NE/ CE/I/UK/4706NE/7156NE)
△ C908	32619085	Ceramic	C1801		100 16V Electrolytic
△ C909	32619073	47 400V Electrolytic			(VCR3716EP)
△ C910	32619088	10 100V Electrolytic			0.033 16V S Chip
C911	32619074	Ceramic	C1802		(VCR3706NE/CE/SE/ 3716NE/CE/UK)
△ C912	32619090	0.033 Metal			47 100V Electrolytic
△ C913	32619094	0.022 Mylar	C1803		2200pF 50V S Chip
C914		0.047 Mylar			(VCR3706NE/CE/SE/ 3716NE/CE/UK)
C915		0.0047 Mylar	C1803		0.033 16V S Chip
C921		47 63V Electrolytic	C1804		(VCR3706NE/CE/SE/ 3716NE/CE/UK)
C924		Electrolytic			150p 50V Ceramic
C925		100 16V Electrolytic			(VCR3706NE/CE/SE/ 3716NE/CE/UK)
C926		Electrolytic			0.1 16V S Chip
C927		470 10V Electrolytic	C1805		(VCR3706NE/CE/SE/ 3716NE/CE/UK)
C928		47 50V Electrolytic			47 16V Electrolytic
C929		470 10V Electrolytic			(VCR3706NE/CE/SE/ 3716NE/CE/UK)
C930		0.01 Mylar	C1806		0.1 16V S Chip
C932	32619087	0.0022 Mylar			(VCR3706NE/CE/SE/ 3716NE/CE/UK)
C934		1.0 50V Electrolytic			47 16V Electrolytic
C935		0.1 25V S Chip	C2001		(VCR3706NE/CE/SE/ 3716NE/CE/UK)
C937		0.001 S Chip (VCR3706NE/CE)	C2002		1.0 50V Electrolytic
C936		0.1 25V S Chip	C2003		82p 50V S Chip
C950		1 50V Electrolytic	C2004		0.01 50V S Chip
C951		10 16V Electrolytic	C2005		220p 50V S Chip
C954		10 16V Electrolytic	C2006		0.01 50V S Chip
C956		10 16V Electrolytic	C2007		47p 50V S Chip
C957		10 16V Electrolytic	C2008		0.01 50V S Chip
C958		10 16V Electrolytic	C2009		82p 50V S Chip
			C2011		47 6.3V Electrolytic

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
CAPACITORS (Continued)					CAPACITORS (Continued)
C2012	0.1	25V S Chip	C5801	47	6.3V Electrolytic
C2203	33	16V Electrolytic (VCR3706NE/CE/SE/3716NE/ CE/I/UK/4706NE/7156NE)	C5802	47	16V Electrolytic (VCR3706NE/CE/SE/3716NE/ CE/I/UK/4706NE/7156NE)
C2204	0.01	16V Ceramic (VCR3716EP)	C5803	47	16V Electrolytic (VCR4706NE/7156NE)
C2208	0.01	50V S Chip	C5804	1000pF	S Chip
C2401	0.01	50V S Chip	C5805	120p	50V S Chip
C2402	47	6.3V Electrolytic	C5806	0.01	50V S Chip (VCR3716NE/CE/I/EP)
C2403	0.01	50V S Chip	C5807	47	6.3V Electrolytic (VCR3706NE/CE/SE/3716NE/ CE/I/4706NE/7156NE)
C2404	1.0	50V Electrolytic	C5808	0.01	50V S Chip (VCR3706NE/CE/SE/3716NE/ CE/I/UK/4706NE/7156NE)
C2405	820p	50V S Chip	C5901	0.01	Ceramic (VCR3706SE/3716NE/CE/I/ EP/UK)
C2406	0.022	S Chip	C5902	32619091	Trimmer
C2407	0.047	Ceramic	C5903	0.01	50V S Chip (VCR3716NE/CE/I/EP)
C2408	10	16V Electrolytic	C5904	22p	50V S Chip (VCR3716NE/CE/I/EP/UK)
C2504	0.01	50V Ceramic (VCR3716EP)	C5905	0.001	Mylar (VCR3716NE/CE/I)
C2506	10	16V Electrolytic (VCR3706NE/CE/SE/3716NE/ CE/I/EP/UK)	C5906	1.0	10V S Chip (VCR3716NE/CE/I/EP/UK)
C2507	470	6.3V Electrolytic	C5907	0.0068	Mylar
C2509	470	6.3V Electrolytic (VCR3716EP)	C5908	0.001	50V S Chip (VCR3716NE/CE/I/EP/UK)
C2603	220	Electrolytic (VCR3716EP)	C5909	0.47	50V Electrolytic
C2604	0.001	S Chip (VCR3716EP)	C5910	560p	50V Ceramic (VCR3716NE/CE/I/EP/UK)
C2605	0.001	S Chip (VCR3716EP)	C5911	47	16V Electrolytic
C4490	0.1	Ceramic (VCR3706SE/3716NE/CE/I/ EP/UK/4706NE/7156NE)	C5912	0.1	Ceramic (VCR3706SE/3716NE/CE/I/ EP/UK/4706NE/7156NE)
C4490	0.01	50V Ceramic (VCR3706NE/CE)	C5912	0.01	50V Ceramic (VCR3706NE/CE)
C4492	47	16V Electrolytic	C5912	22	10V Electrolytic (VCR3716NE/CE/I/EP/UK)
C5001	0.1	Ceramic (VCR3706SE/3716NE/CE/I/ EP/UK/4706NE/7156NE)	C5920	47	6.3V Electrolytic (VCR3716NE/CE/I/EP/UK/
C5001	0.1	50V Ceramic (VCR3706NE/CE)	C5923	4706NE/7156NE)	4706NE/7156NE)
C5002	47	6.3V Electrolytic	C5925	10	10V Electrolytic (VCR3716NE/CE/I/EP/UK)
C5003	0.01	50V Ceramic	C5926	0.1	25V S Chip
C5004	47p	50V S Chip	C5930	18p	S Chip
C5005	0.1	Ceramic (VCR3706SE/3716NE/CE/I/ EP/UK/4706NE/7156NE)	C5931	18p	S Chip
C5005	0.1	50V Ceramic (VCR3706NE/CE)			
C5007	0.1	Ceramic (VCR3706SE/3716NE/CE/I/ EP/UK/4706NE/7156NE)			
C5007	0.1	50V Ceramic (VCR3706NE/CE)			

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description	
CAPACITORS (Continued)					RESISTORS (Continued)	
C5932	22p	50V S Chip (VCR3716NE/CE/I/EP/UK)	R214	10k	S Chip (VCR3706NE/CE)	
C5933	47p	50V S Chip (VCR3716NE/CE/I/EP/UK)	R214	8.2k	S Chip (VCR3706SE/3716NE/CE/ I/EP/UK/4706NE/7156NE)	
C5934	47p	50V S Chip (VCR3716NE/CE/I/EP/UK)	R215	2.7k	S Chip (VCR4706NE/7156NE)	
C5935	47p	50V S Chip (VCR3716NE/CE/I/EP/UK)	R215	3.3k	S Chip (VCR3706NE/CE/SE)	
C5937	1.0	50V Electrolytic (VCR3706NE/CE/3716NE/ EP/UK)	R217	1.0k	S Chip	
C5938	47	6.3V Electrolytic (VCR3716NE/CE/I/EP/UK/ 4706NE/7156NE)	R218	0.0k	S Chip	
C5939	22p	50V S Chip (VCR3716NE/CE/I/EP/UK)	R226	1.2k	S Chip	
C6602	10p	50V S Chip	R228	1.5k	S Chip	
C6681	10	16V Electrolytic	R230	0.0	1/8W S Chip	
C6682	10	16V Electrolytic (VCR3716EP)	R251	1.5k	S Chip	
C6683	10	16V Electrolytic		1.0k	1/8W Carbon	
C6684	0.33	S Chip (VCR3716EP)	R253	220	S Chip	
C6685	0.33	S Chip (VCR3716EP)	R260	560k	S Chip	
C6686	0.33	S Chip (VCR3716EP)	R261		(VCR3706SE/3716NE/CE/I/ EP/UK/4706NE/7156NE)	
C6687	0.33	S Chip (VCR3716EP)	R262	4.7k	S Chip	
C6688	0.01	50V Ceramic (VCR3716EP)	R280	1.5k	(VCR3706NE/CE/SE/3716NE/ CE/I/UK/4706NE/7156NE)	
C7701	47	16V Electrolytic	R301	0.0	S Chip	
C7702	1.0	50V Electrolytic	R302	0.0	S Chip	
C7703		Ceramic	R303	680	S Chip	
C7704	0.1	25V S Chip	R304	1.0k	S Chip	
			R305	22k	S Chip	
				33k	1/8W Carbon	
					(VCR3706NE/CE/SE/3716NE/ CE/I/EP/UK)	
RESISTORS						
R166	1k	S Chip (VCR3706NE/CE)	R306	150	S Chip	
R201	680	1/8W Carbon (VCR3716EP)	R307	10	S Chip	
R202	330	S Chip (VCR3706NE/CE/SE/3716NE/ I/EP/UK/4706NE/7156NE)	R340		S Chip	
R203	22k	S Chip	R350	680	S Chip	
R204	22k	S Chip	R352	10k	S Chip	
R205	390	S Chip	R353	15k	S Chip	
R206	390	S Chip			(VCR3706SE/3716NE/CE/I/ EP/UK/4706NE/7156NE)	
R207	1.8k	S Chip			8.2k	
R208	1.8k	S Chip	R354		S Chip	
R211	0.0k	S Chip	R355	33k	S Chip	
R212	560k	S Chip (VCR3706SE/3716NE/ CE/I/UK/4706NE/7156NE)	R380	6.8k	S Chip	
R213	2.2k	S Chip	R501	0.0	1/8W Carbon	
			R502	680	S Chip	
			R506	820	S Chip	
			R507	10k	S Chip	
			R508	10k	S Chip	
				1.2k	S Chip	

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
RESISTORS (Continued)					RESISTORS (Continued)
R510	27k	S Chip	R617		1.5K 1/8W Carbon
R513	1.0k	S Chip			(VCR3706NE/CE/SE/3716NE/
R514	0.0	S Chip			CE/I/UK/4706NE/7156NE)
R515	1.0k	S Chip	R618		18k 1/8W Carbon
R517	2.2k	S Chip			(VCR3716EP)
R567	0.0	1/8W Carbon	R618		18K 1/8W Carbon
R576	560k	S Chip			(VCR3706NE/CE/SE/3716NE/
		(VCR3706NE/SE/3716NE/I/			CE/I/UK/4706NE/7156NE)
		EP/UK/4706NE/7156NE)	R619		470 1/8W Carbon
R577	0.0	1/8W Carbon	R624		56k S Chip
R601	2.2M	S Chip			(VCR3716EP)
R602	33k	1/8W Carbon	R625		1k S Chip
		(VCR3706NE/CE/SE/3716NE/			(VCR3716EP)
		CE/I/UK/4706NE/7156NE)	R625		100k 1/8W Carbon
R603	220	1/8W Carbon	R626		(VCR3706NE/CE/SE/3716NE/
		(VCR3706NE/CE/SE/3716NE/			CE/I/UK/4706NE/7156NE)
		CE/UK)			820 1/8W Carbon
R604	270k	63V S Chip	R629		(VCR3706NE/CE/SE/3716NE/
		(VCR3716EP)			CE/I/UK/4706NE/7156NE)
R604	270k	1/8W Carbon	R629		15k Carbon
		(VCR3706NE/CE/SE/3716NE/			(VCR3716EP)
		CE/I/UK/4706NE/7156NE)			15K 1/8W Carbon
R605	6.8k	1/8W Carbon	R630		(VCR3706NE/CE/SE/3716NE/
		(VCR3706NE/CE/SE/3716NE/			CE/I/UK/4706NE/7156NE)
		CE/I/UK/4706NE/7156NE)			10k 1/8W Carbon
R606	6.8k	1/8W Carbon	R630		(VCR3706NE/CE/SE/3716NE/
		(VCR3716UK)			CE/I/UK/4706NE/7156NE)
R609	3.3k	1/8W Carbon	R636		10k 1/8W Carbon
		(VCR3706NE/CE/SE/3716NE/	R637		10k 1/8W Carbon
		CE/I/EP/4706NE/7156NE)			(VCR3706NE/CE/SE/3716NE/
R609	3.3k	Carbon			CE/I/UK/4706NE/7156NE)
		(VCR3716UK)			5.6k 1/8W Carbon
R610	2.2M	1/8W Carbon	R638		15k Carbon
		(VCR3706NE/CE/SE/3716NE/	R639		(VCR3716EP)
		CE/I/UK/4706NE/7156NE)			15K 1/8W Carbon
R613	33k	1/8W Carbon	R639		(VCR3706NE/CE/SE/3716NE/
		(VCR3706NE/CE/SE/3716NE/			CE/I/UK/4706NE/7156NE)
		CE/I/UK/4706NE/7156NE)			470k 63V S Chip
R614	6.8k	1/8W Carbon	R651		6.8k S Chip
		(VCR3706NE/CE/SE/3716NE/	R652		4.7 Fuse
		CE/I/UK/4706NE/7156NE)	R653	31517824	2.7k 1/8W Carbon
R615	47k	1/8W Carbon	R654		27 S Chip
		(VCR3706NE/CE/SE/3716NE/	R655		6.8k Carbon
		CE/UK/4706NE/7156NE)	R701		5.6k S Chip
R615	47k	Carbon	R702		1k S Chip
		(VCR3716EP/UK)	R703		1k S Chip
R616	15k	Carbon	R704		220k S Chip
		(VCR3716EP)	R705		1k S Chip
R616	15K	1/8W Carbon	R706		10k S Chip
		(VCR3706NE/CE/SE/3716NE/	R707		10k S Chip
		CE/I/UK/4706NE/7156NE)	R708		22k 1/8W Carbon
R617	1.5k	S Chip	R712		(VCR3716NE/CE/I/UK)
		(VCR3716EP)			

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
RESISTORS (Continued)					RESISTORS (Continued)
R714	100	1/8W Carbon (VCR3706NE/CE/SE/3716NE/ CE/I/UK/4706NE/7156NE)	R758	270	1/8W Carbon
R715	1k	S Chip	R759	100k	S Chip
R716	18k	S Chip	R760	270	1/8W Carbon
R717	39k	S Chip	R761	22k	S Chip
R718	82k	S Chip	R762	22k	S Chip
R719	15k	S Chip	R764	1k	1/8W Carbon
R720	1k	1/8W Carbon (VCR3716I)	R766	1k	S Chip
R721	220k	S Chip	R769	1.0k	S Chip
R722	100k	S Chip	R770	10k	S Chip
R723	100k	S Chip	R771	10k	S Chip
R724	680k	S Chip	R772	22k	S Chip
R725	1k	1/8W Carbon (VCR3716EP)	R774	330k	S Chip
R726	68k	S Chip	R775	10k	S Chip
R727	220k	S Chip	R776	100k	S Chip
R728	330k	S Chip	R777	100k	S Chip
R729	3.9k	S Chip	R779	47k	S Chip
R730	22k	S Chip	R780	1.2M	S Chip
R731	1k	S Chip	R781	22k	S Chip
R732	1k	S Chip	R782	10k	S Chip
R733	1k	S Chip (VCR3706NE/CE)	R784	2.7k	S Chip
R733	1k	1/8W Carbon (VCR3706SE/3716NE/CE/I/ EP/UK/4706NE/7156NE)	R786	1k	1/8W Carbon
R734	1k	1/8W Carbon	R787	1k	1/8W Carbon
R735	1k	1/8W Carbon	R788	1k	1/8W Carbon
R736	1k	1/8W Carbon	R789	1k	S Chip
R737	1k	S Chip	R790	1k	S Chip
R738	1k	S Chip	R791	1k	S Chip
R739	3.9k	S Chip	R792	10k	S Chip
R740	0.0	S Chip	R793	10k	S Chip
R741	1k	1/8W Carbon	R794	(VCR3706NE)	
R742	1k	1/8W Carbon	R799	1k	S Chip
R743	1k	S Chip	R901	470	S Chip
R744	100	1/8W Carbon (VCR3706NE/CE/SE/3716NE/ CE/I/UK/4706NE/7156NE)	R902	1.0M 1/2W	Carbon
R745	1k	1/8W Carbon	R903	4.7k	Wirewound
R746	1k	S Chip	R904	6.8M 0/5W	Carbon
R747		S Chip	R905	6.8M 0/5W	Carbon
R748	10k	S Chip	R906	220k	Carbon
R749	150	S Chip	R907	220k	Carbon
R750	220	1/8W Carbon	R908	56k	1/4W Carbon
R751	150	S Chip	R909	68k	Metal Oxide
R752	220	1/8W Carbon	R910	47	1/2W Carbon
R753	12k	1/8W Carbon	R911	470	1/4W Carbon
R754	12k	1/8W Carbon (VCR3706SE/3716NE/CE/I/ EP/UK/4706NE/7156NE)	R921	47	1/2W Carbon
R755	0.0	S Chip	R922	0.47	Fuse Resistor
R756	150	1/4W Carbon	R927	4.7	1/2W Carbon
R757	100k	S Chip	R931	10	Fuse Resistor
			R932	220	1/8W Carbon
			R933	10k	S Chip
			R934	(VCR3706CE/SE/3716NE/CE/ I/EP/UK/4706NE/7156NE)	
			R935	220	1/8W Metal Oxide
				220	S Chip
				15k	S Chip

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
RESISTORS (Continued)					
R936		2.7k 1/8W Carbon	R1805		1M S Chip
R937		2.7k 1/8W Carbon		(VCR3706NE/CE/SE/3716NE/	
R938		3.9k S Chip		CE/EP/UK)	
R939		6.8k S Chip	R1806		2.2k S Chip
R940		1k 1/8W Carbon		(VCR3706NE/CE/SE/3716NE/	
R941		3.9k S Chip		CE/UK)	
R950		5.6k S Chip	R1807		100k S Chip
R951		33 S Chip	R1810		220 1/8W Carbon
R952		27 1/8W Carbon		(VCR3706NE/CE/SE/3716NE/	
R953		33k S Chip		CE/EP/UK)	
R954		0.56 1/8W Carbon	R1811		220 1/8W Carbon
R955		0.56 1/8W Carbon		(VCR3706NE/CE/SE/3716NE/	
R958		5.6k S Chip		CE/UK)	
R959		33 S Chip	R1812		220 1/8W Carbon
R960		220 1/4W Metal Oxide		(VCR3706NE/CE/SE/3716NE/	
R961		5.6k S Chip		CE/UK)	
R962		33 S Chip	R2001		1k S Chip
R963		220 1/4W Metal Oxide	R2002		1k S Chip
R965		22k 1/8W Carbon (VCR3016NE/CE/I/UK)	R2003		1M S Chip
R971		1.0k 1/2W Carbon	R2004		220 1/8W Carbon
R975		1.0k 1/2W Carbon	R2005		2.7k S Chip
R981		10k S Chip	R2006		5.6k S Chip
R982		10k S Chip	R2007		S Chip
R985	31517836	Fuse Resistor	R2008		100 S Chip
R991		2.2k S Chip	R2009		1.5k Carbon
R992		4.7k S Chip		(VCR3716UK)	
R994		0.0 S Chip (VCR3716NE/CE/I/EP/UK)	R2009		1.2k S Chip
R1401		560k S Chip	R2010		(VCR3706NE/CE/SE/3716NE/
R1402		100 S Chip	R2011		I/EP/UK/4706NE/7156NE)
R1403		330k S Chip			
R1406		0.0 S Chip			
R1410		5.6k 1/8W Carbon (VCR3706NE/CE/SE/3716CE/	R2012		470 S Chip
		I/4706NE/7156NE)	R2401		3.9k S Chip
R1410		0.0 S Chip (VCR3716EP/UK)	R2402		560k S Chip
R1411		0.0 S Chip	R2403		150 S Chip
R1412		1.0k S Chip (VCR3706NE/CE/SE/3716NE/	R2407		2.7k S Chip
		I/EP/UK/4706NER/7156NE)	R2408		8.2k S Chip
R1801		1.2M S Chip (VCR3706NE/CE/SE/3716NE/	R2409		680k S Chip
		CE/UK)	R2501		330 1/4W Carbon
R1802		6.8k S Chip (VCR3706NE/CE/SE/3716NE/	R2502		(VCR3716EP)
		CE/EP/UK)	R2503		1200k 1/4W Carbon
R1803		1.2M S Chip (VCR3706NE/CE/SE/3716NE/	R2504		(VCR3716EP)
		CE/UK)	R2505		100 S Chip
R1804		6.8k S Chip (VCR3706NE/CE/SE/3716NE/	R2506		(VCR3716EP)
		CE/EP/UK)	R2507		75 S Chip
			R2508		(VCR3716EP)
					100 S Chip
					(VCR3716EP)
					75 S Chip
					(VCR3716EP)

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
RESISTORS (Continued)			RESISTORS (Continued)		
R2509	75	S Chip (VCR3716EP)	R5001	100k	S Chip
R2509	75k	1/8W Carbon (VCR3706NE/CE/SE/3716NE/ CE/I/UK/4706NE/7156NE)	R5002	100k	S Chip
R2510	100	S Chip (VCR3716EP)	R5003	100k	S Chip
R2510	100	1/8W Carbon (VCR3706NE/CE/SE/3716NE/ CE/I/UK/4706NE/7156NE)	R5004	100k	S Chip
R2511	75	S Chip (VCR3716EP)	R5005	100k	S Chip
R2511	75	1/8W Carbon (VCR3706NE/CE/SE/3716NE/ CE/I/UK/4706NE/7156NE)	R5006	1.0k	1/8W Carbon
R2511	75	1/8W Carbon (VCR3706NE/CE/SE/3716NE/ CE/I/UK/4706NE/7156NE)	R5007	10k	1/2W Carbon
R2513	22k	Carbon (VCR3716EP)	R5008	27k	1/8W Carbon
R2515	10k	S Chip (VCR3716EP)	R5010	1k	1/8W Carbon
R2516	10k	S Chip (VCR3716EP)	R5801	(VCR3706NE/SE/3716I/EP/ 4706NE/7156NE)	
R2517	10k	S Chip (VCR3716EP)	R5802	10k	S Chip
R2518	10k	S Chip (VCR3716EP)	R5803	(VCR3706NE/CE/SE/3716NE/ CE/I/UK/4706NE/7156NE)	
R2520	22k	Carbon (VCR3716EP)	R5803	2.2k	1/8W S Chip
R2521	22k	Carbon (VCR3716EP)	R5804	(VCR3716NE/CE/UK)	
R2522	22k	Carbon (VCR3716EP)	R5805	2.2k	S Chip
R2523	10k	S Chip (VCR3716EP)	R5806	(VCR3706NE/CE/SE/3716NE/ CE/I/UK/4706NE/7156NE)	
R2541	100	S Chip (VCR3716EP)	R5807	2.2k	S Chip
R2544		S Chip (VCR3716EP)	R5808	(VCR3706NE/CE/SE/3716NE/ CE/I/UK/4706NE/7156NE)	
R2545	390	1/8W Carbon (VCR3706NE/CE/SE/3716NE/ CE/I/UK/4706NE/7156NE)	R5809	31129688	VR
R2548		S Chip (VCR3716EP)	R5809	31129689	(VCR3716NE/CE/UK)
R2549	22k	Carbon (VCR3716EP)	R5810	VR	(VCR4706NE/7156NE)
R2601	820	1/4W Carbon	R5810	100k	S Chip
R2609	47k	1/8W Carbon	R5811	3.3k	S Chip
R2609	47k	Carbon (VCR3716I)	R5812	2.2k	S Chip
R2611	15k	Carbon (VCR3716EP)	R5813	(VCR3706NE/CE/SE/3716NE/ CE/I/UK/4706NE/7156NE)	
R2612	18k	Carbon (VCR3716EP)	R5814	3.3k	S Chip
R2613	10k	S Chip (VCR3716EP)	R5814	1.8k	S Chip
R2614	100	S Chip (VCR3716EP)	R5815	(VCR4706NE/7156NE)	

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
RESISTORS (Continued)					RESISTORS (Continued)
R5816	6.8k	1/8W Carbon (VCR3706NE/CE/SE/3716NE/ CE/I/UK/4706NE/7156NE)	R6618	1.0k	1/8W Carbon (VCR3706NE/CE/SE/3716NE/ I/UK/4706NE/7156NE)
R5817	220	S Chip (VCR3716NE/CE/EP/UK)	R6619	22k	1/8W Carbon (VCR3706NE/CE/SE/3716NE/ I/UK/4706NE/7156NE)
R5901	1.0k	S Chip (VCR3716CE/I/EP/UK)	R6620	1.2k	1/8W Carbon (VCR3706CE/SE/3716NE/I/ UK/4706NE/7156NE)
R5902	10k	S Chip (VCR3716NE/CE/I/EP/UK)	R6623	22k	1/8W Carbon (VCR3706CE/SE/3716NE/I/ UK/4706NE/7156NE)
R5903	1.5k	Carbon (VCR3716NE/CE/I/EP/UK)	R6624	150k	Carbon (VCR3716EP)
R5904	1.0k	1/8W Carbon (VCR3716NE/CE/I/EP/UK)	R6650	820k	S Chip (VCR3716EP)
R5905	56k	S Chip (VCR3706NE/CE/SE3716NE/ CEI/EP)	R6650	820	1/8W Carbon (VCR3706NE/CE/SE/3716NE/ I/UK/4706NE/7156NE)
R5908	47k	1/8W Carbon (VCR3716NE/CE/I/)	R6803	0.0	S Chip (VCR3706NE/CE/SE/3716NE/ CE/I/UK/4706NE/7156NE)
R5909	22k	1/8W Carbon (VCR3716NE/CE/I/EP/UK)	R6804		S Chip (VCR3716EP)
R5910	470	1/8W Carbon (VCR3706NE/CE/SE3716NE/ CEI/UK)	R6805		S Chip (VCR3706NE/CE)
R5911		S Chip (VCR3716EP)	R6806		S Chip (VCR3716EP)
R5921	39k	S Chip (VCR3716NE/CE/I/EP/UK)	R6817	4.7k	S Chip (VCR3716EP)
R5922	10k	S Chip (VCR3716NE/CE/I/EP/UK)	R6992		S Chip (VCR3706NE/CE/SE/3176EP)
R5923	47k	S Chip (VCR3716NE/CE/I/EP/UK)	R7701	31517837	2.2 Fuse Resistor
R5924	1.0k	S Chip (VCR3716NE/CE/I/EP/UK)	R7702	10k	1/8W Carbon
R5925	180	S Chip (VCR3716NE/CE/I/EP/UK)	R7703	10k	1/8W Carbon
R5931	560	1/8W Carbon (VCR3706NE/CE/SE/3716NE/ CE/I/UK/4706NE/7156NE)	RJ1		S Chip (VCR3716CE/I/UK/ 4706NE/7156NE)
R5963	390	S Chip S Chip (VCR3706NE/CE/SE/3176EP)	RJ3		S Chip (VCR3716CE/I/UK/ 4706NE/7156NE)
R5991		S Chip (VCR3706NE/CE/SE/4706NE/ 7156NE)	RJ11		S Chip (VCR3716CE/I/UK/ 4706NE/7156NE)
R5992		S Chip (VCR3706NE/CE/SE/4706NE/ 7156NE)	RJ12		S Chip (VCR3716CE/I/UK/ 4706NE/7156NE)
R5994		S Chip (VCR3706NE/CE/SE/3716EP/ 4706NE/7156NE)	RJ13		S Chip (VCR4706NE/7156NE)
R5994	180	1/8W Carbon (VCR3716EP)	RJ22		S Chip (VCR3716CE/I/UK)
R6612	820k	S Chip (VCR3716EP)	RJ28		S Chip (VCR3716CE/I/UK/ 4706NE/7156NE)
R6617	2.2k	S Chip (VCR3716EP)			
R6618	1k	S Chip (VCR3716EP)			



MISCELLANEOUS PARTS

41314365

AC Cord

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
MISCELLANEOUS PARTS (Continued)					
⚠	41314364	AC Cord (VCR3716UK only)	SC8801		Socket, 6pin (OA)
CN1501	41314366	Tun-Conv Cable	S8801	41127613	Switch, Stop/Eject
DG5001	36861179	Digitron	S8802	41127613	Switch, PLAY
⚠ F901	43752108	Fuse, T2AH/250V	S8803	41127613	Switch, REC
FB701		Balun	S8804	41127613	Switch, Pause/Still (VCR3716EP)
FB2201		Balun	S8805	41127613	Switch, Ch +
FB2501		(VCR3706NE/CE/SE/3716NE/ I/EP/UK/4706NE/7156NE)	S8806	41127613	Switch, Ch -
FB2502		Balun			
FB6301		Balun			
FB6302		Balun			
⚠ FH901	43752146	Fuse Holder			
⚠ FH902	43752147	Fuse Holder			
P501		Plug, 3pin (AO)			
P701		Plug, 6pin (AO)			
P702		Plug, 2pin (AL)			
P703		Plug, 9pin (AO)			
⚠ P901	41314353	Plug, 2pin (PA)			
P5001		Plug, 2pin (AO)			
P6801		Plug, 5pin (AO) (VCR4706NE/7156NE)			
P6802		Plug, 14pin (AO)			
P6805		Plug, 2pin (AO)			
RMC5501	69134748	Remote Receiver			
S701	41127607	Switch, Rec			
S5001	41127612	Switch, Standby			
S5002	41127612	Switch, Ch +			
S5003	41127612	Switch, Ch -			
S5004	41127612	Switch, Int			
S5005	41127612	Switch, Test			
SC301		Socket, 4pin (AH)			
SC701		Socket, 7pin (AD)			
SC2501		Socket, RGB			
SC2502		Socket, RGB (VCR3716EP)			
SC6301		Wire Harness (VCR4706NE/7156NE)			
SC6302		Socket, 14pin (AD)			
SC6802		Socket, 8pin (AD)			
TP1501		Plug, 4pin (AO)			
TP5801		Plug, 2pin (AO)			

— End of Main —

— End of Operation —

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
MECHANISM CHASSIS PARTS					
1		Main Chassis Ass'y	47	73584924	Loading Double Action Spring
2		Supply Impedance Roller	48	75484283	Reel Disk
3		Supply Impedance	49	75484284	Reel Idler
4	75383478	Roller Cap	50	83186184	Clutch Lever
5	75383479	Supply Impedance	51	75383482	Clutch Gear Ass'y
6	86817304	Roller Lower Frange	52	75484285	Reel Pulley Ass'y
7	86817305	Supply Impedance	53	75251446	Playback Gear
8	75384916	Roller Inner	54	83186176	Clutch Connect Arm
9	83186180	Guide Roller	55	86817351	Take-Up Main Brake Ass'y
10	73584917	Reverse Guide Lever	56	86817316	Take-Up Lock Lever
11	73584918	Ass'y	57	86817352	Supply Main Brake Lever Ass'y
12	43359496	Reverse Guide Spring	58	73584925	Main Brake Spring
13	83186171	Audio/Control Head	59	75251447	Cassette Housing
14	73584919	Audio/Control Head Arm	60	75251448	Control Drive Gear
15	73584920	Audio/Control Head	61	83186185	Light Guide
16	43359497	Arm Spring	62		Slow Brake Ass'y
17	83186170	Azimuth Spring	63	44329415	Slow Brake Spring
18		Full Erase Head	64	44329416	Capstan Motor
19		Audio/Control Head	65	41314352	Loading Motor
20	76184353	Arm Spacer	66	41314349	Lead Wire for Loading Motor
21	75383480	Audio/Control Head PWB	67	41314363	FFC for Audio/Control
22	86817306	Socket, 8 pin	70	86817319	FFC for Drum Motor
23	75383481	Reel Belt	71		Drum Base
24	86817307	Pinch Roller Lever Ass'y	72	86817320	Drum Base Mounting
25	83186172	Pinch Double Action	73	73584927	Screw (SW3P+8S)
26	73584921	Lever	74	44329419	Drum Earth Brush
28	83186173	Pinch Drive Lever Ass'y	75		Drum Earth Brush Spring
29	83186174	Pinch Drive Cam	76	43359501	Drum Drive Motor
30	73584923	Open Lever			Drum Drive Motor
31	86817308	Pinch Double Action			Mounting Screw
32	75251442	Spring			(SW2.6P+6S)
33	86817309	Tension Arm Ass'y			Upper and lower drum
34	83186173	Tension Arm Boss			Ass'y
35	86817348	Tension Spring			(VCR3706NE/CE/SE/3716NE/
36	86817312	Tension Band Ass'y			CE/EP/I/4706NE/7156NE)
37	75251443	Tension Pole Adjust Cam			Upper and lower drum
38		Master Cam	76	43359502	Ass'y
40	75251444	Motor Pulley			(VCR3716UK)
41	86817313	Worm Gear			
42	86817314	Worm Wheel Gear			
43	83186181	Relay Gear			
44	75251445	Loading Motor Block			
45	83186182	Shifter			
46		Shifter Drive Lever Ass'y			
		Take-Up Loading Gear			
		Take-Up Loading Arm			
		Ass'y			
		Supply Loading Gear			
		Supply Loading Arm			
		Ass'y			
		Auto Head Cleaner			
		Ass'y			

— End of Mechanism Chassis Parts —

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
CASSETTE HOUSING CONTROL PARTS					SCREWS, NUTS AND WASHERS
300	83186194	Cassette Housing	200		Set Screw
		Control Ass'y	201		Audio/Control Head
301	86817323	Slide Holder (L)			Screw
302	86817324	Slide Holder (R)	202		Tilt Adjusting Screw
303	86817347	Drive Angle	203		Azimuth Adjusting
304	83186188	Double Action Rack			Screw (2.6P+6S)
305	73584928	Double Action Spring	204		Screw, C2.6P+8S
306		Slider			(For FE Head)
307	86817325	Holder (L)	206		Screw, SW3P+5S
308	83186189	Proof Lever (L)			(For Loading Motor Block)
309	73584929	Proof Lever (L) Spring	207		Screw, C2.6P+7S
310	86817326	Holder (R)			(For Capstan Motor)
311	73584930	Cassette Spring	208		Screw, C2.6P+6S
312	83186190	Proof Lever (R)			(For Loading Motor
313	73584931	Proof Lever (R) Spring			Angle Ass'y)
314		Drive Gear (L)	209		Screw, C3P+8S
316		Drive Gear (R) AD			(For Drum Base)
317	73584933	Drive Gear (R) Spring	210		X-Position Adjusting Nut
318	75251449	Synchro Gear	211	86817321	Reverse Guide
319	75251450	Main Shaft			Adjusting Nut
320	86817345	Upper Plate	212		Audio/Control Head
321	86817328	Door Open Lever			Adjusting Nut (M4)
322	83186177	Sensor Lever	214		Washer, W5.2P-11-0.5
323	73584934	Sensor Lever Spring			(Reel Height Adj.)
324		C3P+8S (for Cassette	215		Washer, W5.2P-11-0.3
		Housing Control)			(Reel Height Adj.)
			216		Washer, W5.2P-11-0.4
			217		(Reel Height Adj.)
			218		Washer, W5.2P-11-0.6
			219		Washer, W5.2P-11-0.7
			220		Washer, W3.1-7-0.25
			221		Cut Washer,
					CW4.5P-10-0.5
			222		Cut Washer,
					CW2.6P-5.4-0.5
			223		Cut Washer,
					CW2.6P-6-0.5
			224		E-Ring, E-4
					Screw, C3P+4S
					(For Slow Brake Spring)

— End of Cassette Housing Control Parts —

— End of Screws, Nuts and Washers —

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description	
MECHANICAL PARTS					FRONT PANEL PARTS	
601		Main Frame Ass'y	501	64183492	Front Panel Ass'y (VCR3716NE/CE/I/EP)	
601-1		Main Frame	501	64183493	Front Panel Ass'y (VCR3716UK)	
601-2	62734066	Foot Felt	501	64183494	Front Panel Ass'y (VCR3706NE/CE/SE)	
602		Antenna Terminal Cover	501	64184211	Front Panel Ass'y (VCR4706NE)	
603	61355218	Top Cabinet (VCR3706NE/CE/SE/3716NE/ CE/I/EP/UK)	501	64184213	Front Panel Ass'y (VCR7156NE)	
603	61355218	Top Cabinet (VCR4706NE/7156NE)	501-1	64183495	Front Panel (VCR3716NE/CE/I/EP/UK)	
604		Bottom Plate	501-1	64183496	Front Panel (VCR3706NE/CE/SE)	
605		Toe Cabinet Fixing Angle (R)	501-1	64184210	Front Panel (VCR4706NE)	
606	86817346	Top Cabinet Fixing Angle (L)	501-1	64184212	Front Panel (VCR7156NE)	
607		H/A Shield	501-2	86817344	Badge, "NOKIA" (VCR3706NE/CE/SE/3716NE/ CE/I/EP/UK)	
608		Spacer	501-3	64660262	Cassette Flap (VCR3706NE/CE/SE/3716NE/ CE/I/EP/UK)	
609		Screw	501-3	64660273	Cassette Flap (VCR4706NE/7156NE)	
610		Screw	501-4	63280481	Front Decoration Window (VCR3706NE/CE/SE/3716NE/ CE/I/EP/UK)	
611		Screw	501-4	63280487	Front Decoration Window (VCR4706NE/7156NE)	
612		Screw	501-5	63280478	Button, Operate	
613		Screw	501-6	63280479	Button, Channel/Rec	
614		Screw	501-7		Button, Channel Set	
615		Spacer	501-8	64660263	Cassette Spring	
616		Screw	502		Dial	
618		Spacer	503	63280480	Button Ass'y	
			503-1		Button, Stop/Eject	
			503-2		Button, Pause/Still	
			503-3		Button Holder	
			503-4		Spring	
			503-5		Button, Play	

— End of Mechanical Parts —

— End of Front Panel Parts —

Ref. No.	Part No.	Description
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SUPPLIED ACCESSORIES

ACCESSORIES

41314245	75ohm Coaxial Cable
56521918	Infrared Remote Control
	Unit (VCR3706NE/CE/SE 7156NE)
56521912	Infrared Remote Control
	Unit (VCR3716NE/CE/I/EP)
56521928	Infrared Remote Control
	Unit (VCR3716UK)
56521931	Infrared Remote Control
	Unit (VCR4706NE)

ACCESORIES (NOT REPLACEMENT ITEM)

66127564	Operation Manual (VCR3706NE)
66127562	Operation Manual (VCR3706CE)
66127563	Operation Manual (VCR3706SE)
66127558	Operation Manual (VCR3716NE)
66127557	Operation Manual (VCR3716CE)
66127559	Operation Manual (VCR3716I)
66127560	Operation Manual (VCR3716EP)
66127561	Operation Manual (VCR3716UK)
66127801	Operation Manual (VCR4706NE)
66127802	Operation Manual (VCR7156NE)
61628955	Printed Packing Case (VCR3706NE)
61628953	Printed Packing Case (VCR3706CE)
61628954	Printed Packing Case (VCR3706SE)
61628950	Printed Packing Case (VCR3716NE)
61628948	Printed Packing Case (VCR3716CE)
61628951	Printed Packing Case (VCR3716I)
61628949	Printed Packing Case (VCR3716EP)
61628952	Printed Packing Case (VCR3716UK)
61628975	Printed Packing Case (VCR4706NE)
61628975	Printed Packing Case (VCR7156NE)

— End of Supplied Accessories —

11. EXPLODED VIEWS/ MECHANISM CHASSIS PARTS

A

B

C

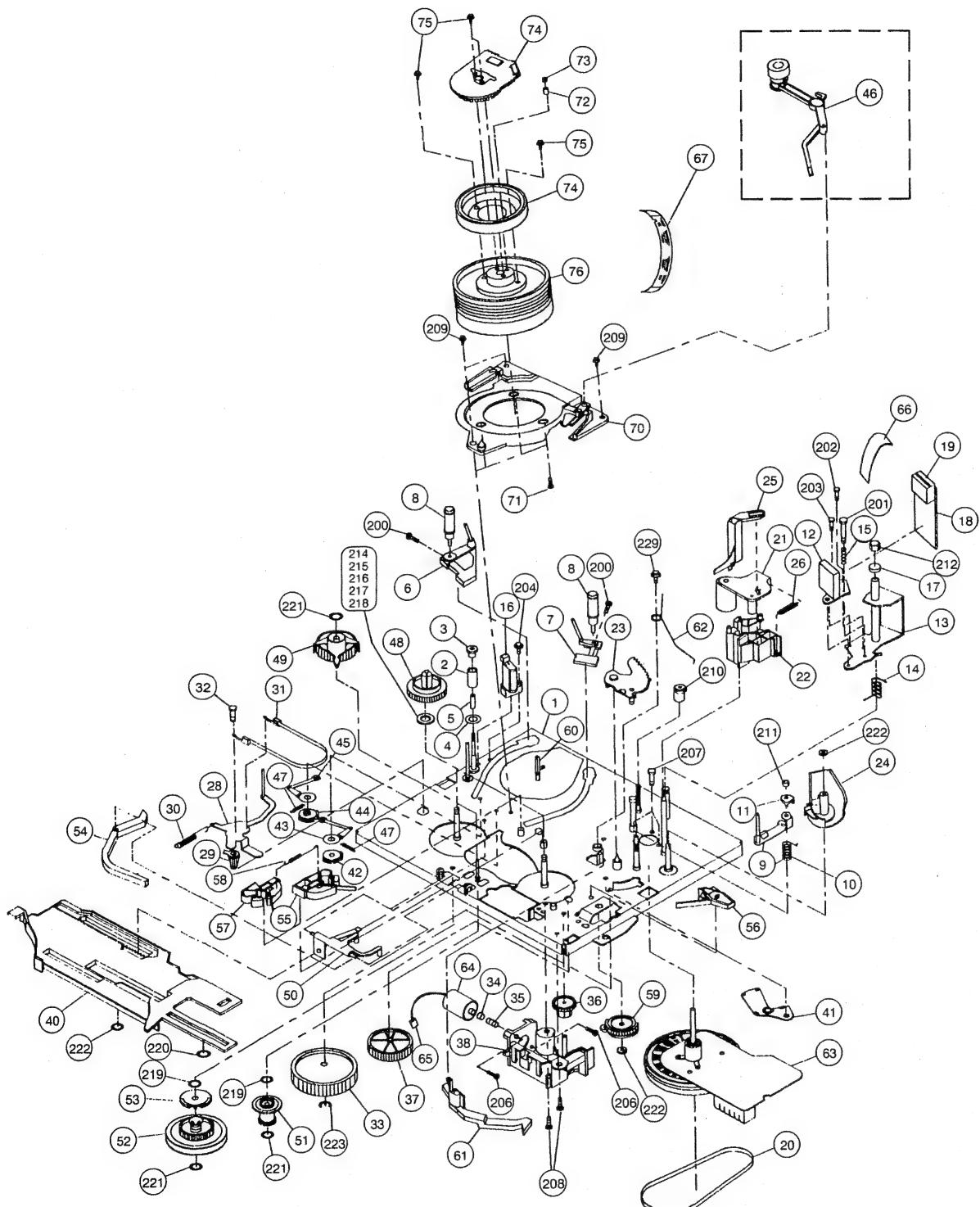
D

E

F

G

H



CASSETTE HOUSING CONTROL PARTS

A

B

C

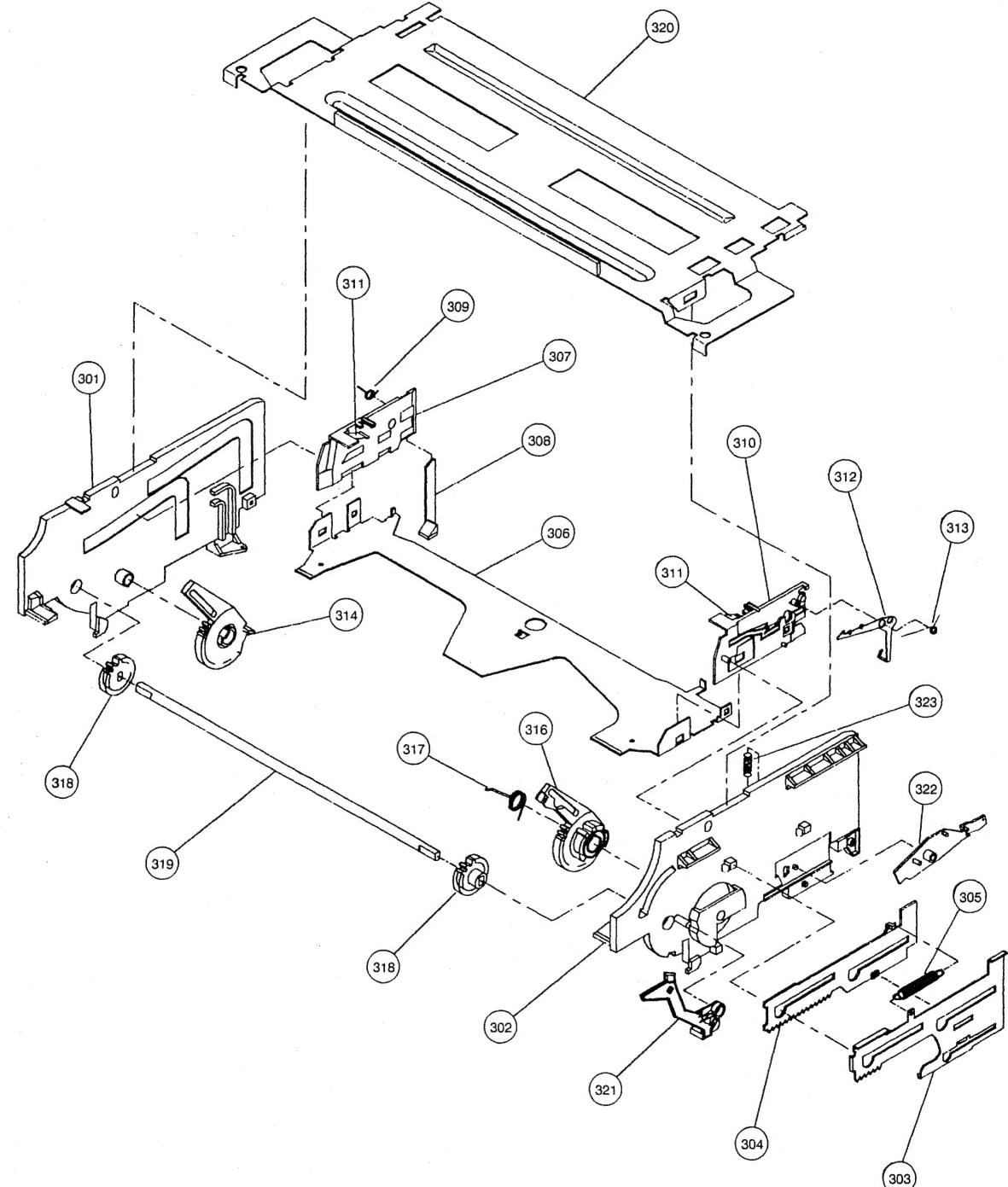
D

E

F

G

H



1

2

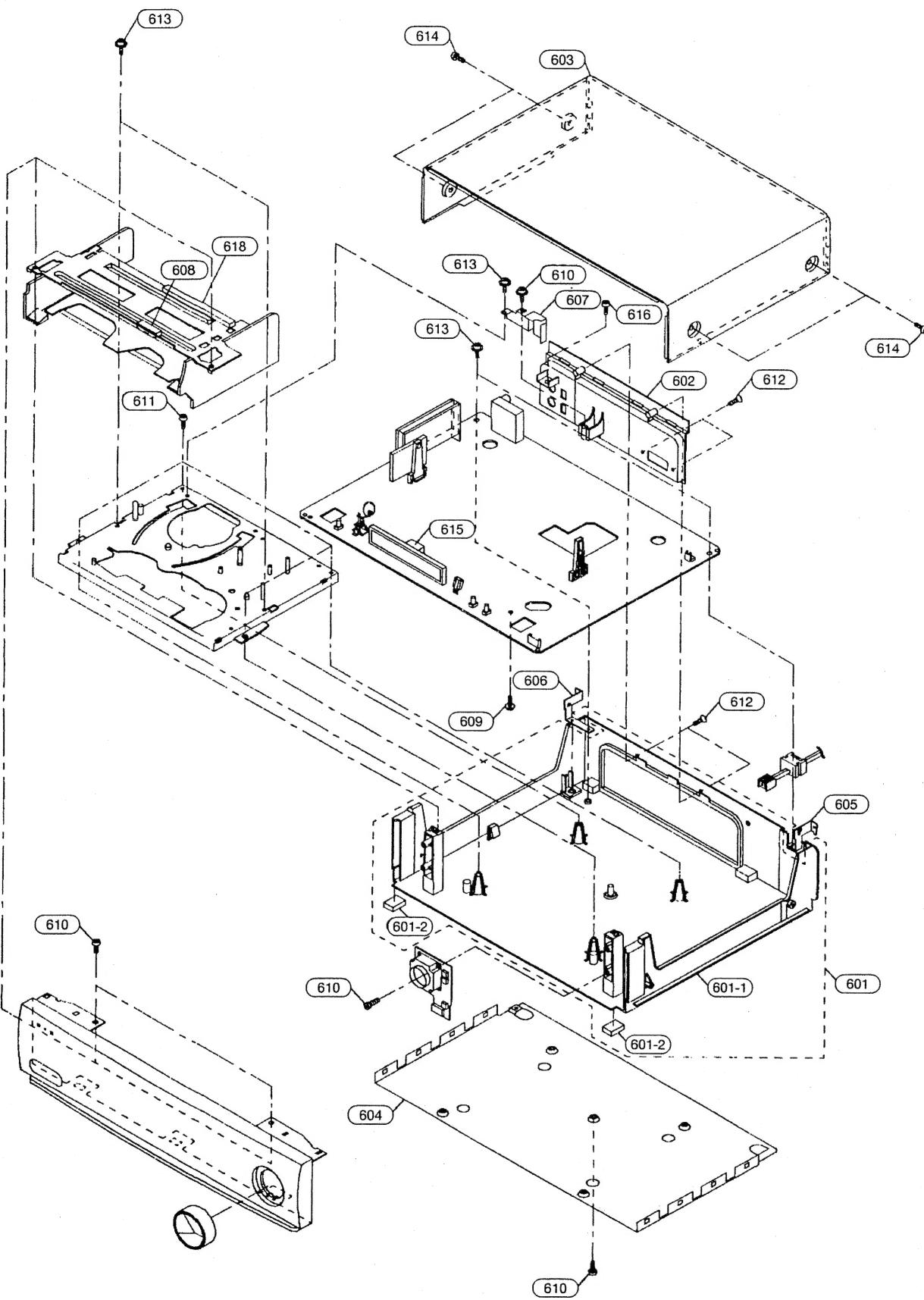
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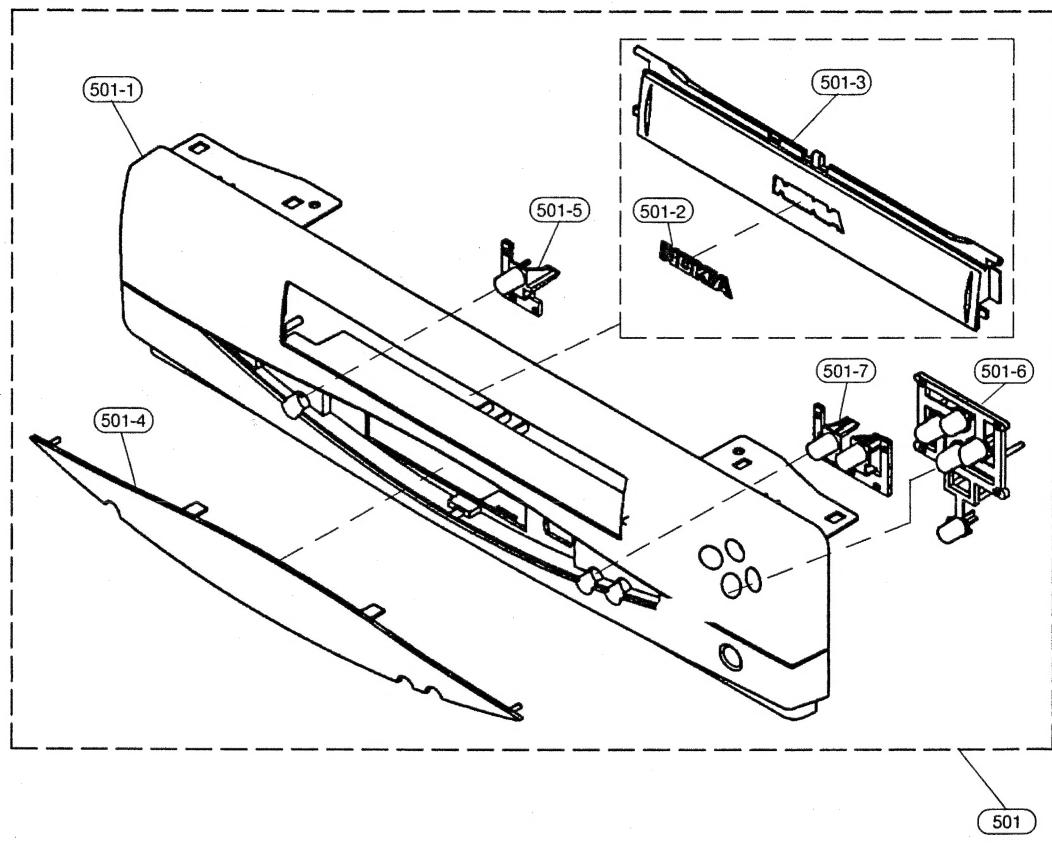
MECHANICAL PARTS



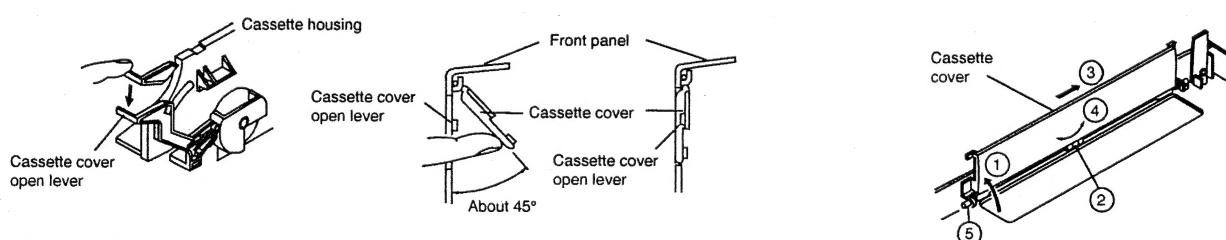
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FRONT PANEL PARTS

A
B
C
D
E



PRECAUTION ON FRONT PANEL SET-UP



Before attaching the front panel in position, make sure that the cassette cover open lever is in its right place (lower-most). If it is out of position, push it down with a finger.

Keep the cassette cover about 45° open and make sure that the cassette cover open lever is between the front panel and the cassette cover. Now fix the front panel in place.

Do not mount the front panel with the cassette cover tilted too open. Otherwise the cassette cover might wrongly run on the cassette housing.

Removing the cassette compartment cover.
 1 Open the cassette compartment cover fully.
 2 Remove the center positioner.
 3 Slide the cover to the right.
 4 Slightly bend the cover.
 5 Draw out the left-side rod.

12. PACKING OF THE SET

Setting position of the Knobs

RF Converter	at "E36" position
Test Signal	at "OFF" position

Accessories

- ♠ Operation manual
- 75 ohm coaxial cable
- Battery

